

THE INDEPENDENT
Fourth Annual

PC MAGAZINE

VOLUME 7 NUMBER 1
JANUARY 12, 1988

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- 8 Solutions for Remote Computing
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- Tandy's 1000 Series: Computers for the Masses?

THE BEST
OF
1987



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Reliable, Secure, Affordable

- Plus
1987 Awards
for Technical
Excellence



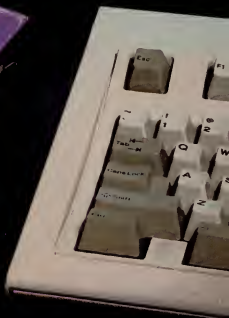
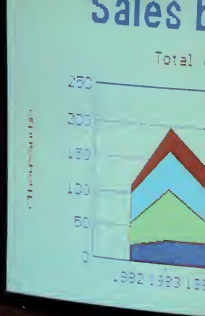
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	Full Graph Customization	YES	NO
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VERSATILITY	PostScript Support	YES	NO
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	Pop-down menus	YES	NO
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WHAT'S INSIDE

In First Looks, Borland International's Turbo Pascal 4.0, the latest version of that tried-and-true compiler, is put under the glass. And in this issue's Productivity section, veteran programmers Michael Mefford and Tom Kihlken present the first two parts of a memory-resident on-line help programming utility. Any text information you can display, CAPTURE can grab—including color. And HELP lets you redisplay it in a snap.

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Recommender: Thom Cl'Connor



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PRODUCTIVITY

Each issue of PC Magazine contains free programs, tutorials, user tips, and applications advice to help our readers gain technical proficiency. We're very interested in receiving user tips (on disk, please) and are eager to hear from assembly language programmers who can help us develop useful PC Magazine utilities. Unfortunately, because of the large volume of mail, we can't acknowledge or respond to all submissions. Contact:

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Dan A. Griffin

The Newsletter of the AutoCAD User's Group

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Test Microsc, PC Tech Journal (Rated #1)

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Mark Weiss, InfoWorld (Rated #1)

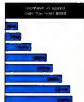
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Steve Manes, PC Magazine
Best of 86 review

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Memory Resident

That's because the idea of a memory resident spreadsheet makes sense, one that you can pop-up instantly while working in your word

way we dreamed a spreadsheet would function. Everyone who has seen it says things like: "Lucid 3-D is how software of the 1990's will look and perform", or even more to the point "This is the way I thought a computer should work". You'll see: Lucid is exciting.

way. Users say "It is so intuitive that I really don't need a manual." That's because we use something we call a visual command menu. Jim Seymour, the noted PC columnist, talking about Lucid in a recent article said that: "If there ever was an interface idea so good it ought to be stolen and widely used, this is it."

What he was talking about is a new menu approach that follows a simple design concept: it is easier to recog-



FIG. 2 Here we are, instantly. Notice the lower left corner showing we are on level 2. You can go down or up. (See next page)

processor or any other program. Lucid lets you cut anything on the screen and paste it right into Lucid, or cut anything from a Lucid worksheet and paste into the application below. You can even run Lucid on top of 1-2-3 if you like, and cut and paste information from one to the other, including formulas.

Lucid 3-D was developed over the past two years with countless, exhaustive hours of planning and programming to produce something spectacular. This is a product that works the

multi-dimensional. Any cell of the spreadsheet can contain a complete other spreadsheet that you can access with a single keystroke. It is as simple as the pictures show. And you don't have to write formulas to do that. All you do is go look at the other file, navigating through easy, point and shoot directories. When you come back up (with one key) the link is made automatically for you.

Everything about Lucid works that

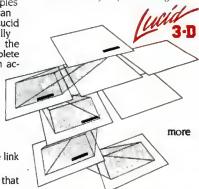


FIG. 1 Let's get the detail on those ad costs. Just move the widbar to that cell and press one key (grey +).

What Makes It so Special

In the screen examples you can see Lucid is really

nize than it is to remember. As choices are made on a menu that take you to lower levels you always can see exactly where you came from and where you are going. The complete menu path is always visible. You cannot get lost several levels down. This means you never have to remember a command, you just flow right to it.



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Any cell can contain a complete other spreadsheet that you can access with a single key.

Plus, no matter where you are on a menu or what you are doing, just press function key F1, and you will get a help screen specific to that command or action. Or if you want to know about any subject you can pop up an index of over 400 topics and select the one you want.

Notepad Behind Every Cell

Another 3-D feature is that any cell can also contain a multiple page note that you instantly access with a single keystroke. You can write



FIG. 4. Now, instantly we are on level 3. Each level is a different spreadsheet. You could now move to the New York Times and see the detail on that figure. There is no limit to the levels you can go. Move right down to transaction level if you like.

notes, memos or letters that relate to your work, save them as individual files and even print them separately or with your spreadsheet.

Speed

Lucid 3-D is truly revolutionary. It is fast, fast, fast! It is incredibly quick in performing calculations because it doesn't recalculate every cell every time you insert an entry. Instead, it only recalculates the specific cells that are affected by your change. This is called minimal recal. Lucid also has a remarkable innovation called background recal in which you are given control of the cursor the moment calculations affecting your viewing screen are completed. Other calculations you don't see continue on in the background during the next commands. The end result of this powerful combination is you rarely wait for a recalculation with Lucid. You find out what instantaneous is all about.

Lucid Learns

Lucid 3-D also lets you teach it any

combinations of keystrokes so that involved sequences can be

done with single keys. Plus more than just remembering keystrokes, Lucid allows you to create Macros with loops, procedures and conditional branching amazingly all done automatically with simple menus. You can create your own menus that show the new features you have taught it. Another great feature is you can make your custom menus work like Lucid where one choice can take you down a level to a whole new set of choices. What's nice is that they will work from one spreadsheet to another.



FIG. 3 We want more detail, so let's go to Newspapers. Just press the Grey + Key

“The best idea I've seen for a spreadsheet in years.”

Jim Seymour, Columnist, PC Magazine, PC Week



Fig. 5. Of course, Lucid does multiple windows. Notice, you can simultaneously open windows in different directories, different drives, even down as many as 3-D levels as you like. No one else can do that.

Mouseability

Lucid 3-D was designed for both keyboard enthusiasts and mouse lovers alike. You can take your pick. Designed around the mouse from the ground up, the interface is smooth and natural. You select files to load from directory lists. Everything is point and click. What's more, any Lucid 3-D menu selection can be "moused" and the response time is "right now" instead of the sluggish "a little bit behind you" feel of add-on mouse menu systems like those you've seen with 1-2-3.

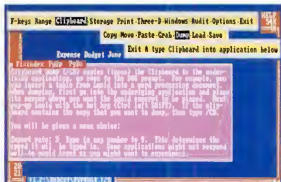


FIG. 6 We need those budget figures in the Word Perfect letter we are writing. Clipboard Dump does it right now.

A window pops up with a library of function names you can pass through with the mouse. Select, click and it's in the formula with no typing required. You even have a label window that you can fill (from the keyboard) with favorite labels and names so that you can insert them later with the mouse. There's even a pop-up calculator to insert numbers so you don't have to go to the keyboard very often.

It really permits that feeling of becoming one with your word. Lucid 3-D has windows of user defined range names as well as the macros named by the user that can be selected just by pointing and clicking. Icons that are easy to grab with the mouse let you resize and move the spreadsheet window with the ease you would expect. Plus you can go anywhere on the sheet by moving the mouse and clicking on the spreadsheet borders. And remember Lucid is designed so that any of those features are done with or without the mouse easily and quickly.

Audit

When you are staking a big decision on information gained from a spreadsheet you need to be certain that you have made no mistakes. Lucid offers five audit displays and printouts.

Masterwork

We could go on at great length about all the features and innovations in Lucid, but Lucid is more than a bag of features. What is most important is the pride and craftsmanship that went into its creation. It is a master-



Makers of **LIGHTNING**[™]
disk speed up software, and
BREAKTHRU 286 Accelerator Board.

FIG. 7 Here it is right in Word Perfect (or any word processor) just like you typed it. You can go the other way just as easily.



work. The overall feel is tight and polished. In fact, Paul Somerson, executive editor of PC Magazine, used one word to describe it, "Slick".

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Even if you don't plan to abandon 1-2-3, Lucid makes sense. Files are converted between them with ease so there's not an interoffice compatibility problem. This means you can have the power and fun of Lucid 3-D without having to upset your present systems.

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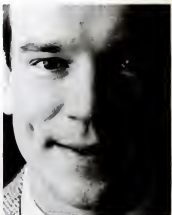
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9:32: *"Another database manager? I couldn't get to first base with the last one."*



11:45: *"Okay; so forms are easy; I bet they'll zap me when I get to reports."*



2:03: *"I don't believe it. Finally, a database manager I can manage."*

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DECEMBER 31, 1987

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LETTERS TO PC MAGAZINE



GETTING AT THE CORE

In Winn L. Rosch's article "Better Tools for Backup" (*PC Magazine*, April 28, 1987), he chose *Corefast* as an Editor's Choice, stating "it easily restored what it backed up." So I bought the product, backed up my hard disk several times, and was preparing to break the DOS partitions and reformat my drive with DOS 3.2.

Imagine my horror after reading Vincent Puglia's article "Corporate and Individual Software Strategies for File Backup" (*PC Magazine*, October 27, 1987). In reference to *Corefast* he writes, "Using it in the high-speed mode, however, is a lot like walking a tight-rope—without a net." The Fact File also states that the high-speed mode is not reliable.

Will the real review please stand up! I now own a product that I'm not sure that I can trust, and I have to wonder if it is even wise to reformat my hard drive. How can *Corefast* successfully back up Mr. Rosch's two test files but not perform satisfactorily in Mr. Puglia's tests?

David R. Planitz
Cortland, Ohio

I am in complete agreement with Vincent Puglia's recommendation to use the slow-speed mode with *Corefast* ("Corporate and Individual Software Strategies for File Backup"). My client had to replace both floppy disk and hard disk drives, and *Corefast* would not read the backup disk. A call to Core International revealed that the high-speed mode is very finicky with

respect to head alignment. What is most disconcerting is that this "feature" is not documented, thereby preventing the end user from making an informed decision as to which mode to use.

Paul K. Jones
Sinking Spring, Pennsylvania

In Vincent Puglia's review of *Corefast*, he criticizes it for being temperamental and unreliable in high-speed mode ("Corporate and Individual Software Strategies for File Backup"). However, when Winn L. Rosch reviewed the same program, he deemed it reliable in high-speed mode ("Better Tools for Backup"). Based on Mr. Rosch's review, I bought *Corefast*. The high-speed backup and restore facilities have worked well, allowing me to move sets of files rapidly among different hard disks.

Benjamin Seaver
Brattleboro, Vermont

When I tested the backup software, I looked at it as a backup-restore system. I considered not only speed and ease of use, but also the reliability of the restore part of the system. Simply put, under my rigorous testing conditions, few of the backup software programs I tried were able to restore files reliably.

I did not encounter any difficulties using Corefast in high-speed mode. In fact, it was the only program tested that was able to restore without error from a floppy disk with known errors. Hence, I recommended it as an Editor's Choice. The fact that Corefast did not receive an Editor's Choice in Vincent Puglia's later and more comprehensive review does not reflect negatively against the program.

—Winn L. Rosch

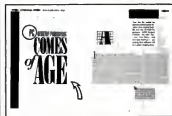
VENTURA VIEWS

Thank you for your articles about the growing field of desktop publishing ("PC Desktop Publishing Comes of Age," *PC Magazine*, October 13, 1987). It is apparent that much hard work was done to produce such excellent reviews.

Your readers may have received a mistaken impression, however, concerning *Ventura Publisher's* ability to display the logo that was specified in your samples. I had no trouble duplicating the logo in *PC Paintbrush* and importing it to *Ventura* with the gray screen pattern intact. Since you used *PC Paintbrush* to draw the logo for the review of *The Office Publisher*, you could have easily achieved the results that your specifications called for, and *Ventura* would have looked even better.

C. A. Wyse
Vancouver, British Columbia
Canada

I enjoyed your issue on desktop publishing ("PC Desktop Publishing Comes of Age"). In fact, I took your advice and



bought *Ventura Publisher*. But alas, it does not do dictionary hyphenation, so I can't turn out professional products with it. And unfortunately, I took your earlier advice and sold my copy of *DisplayWrite*, the only word processor I know of that

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- ☐ UTILITIES 1—A collection of invaluable general purpose DOS utilities. An absolute must for all
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- ☐ UTILITIES 3—A comprehensive set of debugging and diagnostic utilities for monitoring your computer

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- ☐ SHELL 4a,b—(2 disks) Autoemu and HOM 1.4.04 hard disk prog. for custom full-screen menus
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- ☐ UTILITIES 6—Advanced utilities including Mass/Release (remove resident programs) w/ reboot
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LETTERS

does do dictionary hyphenation, and bought WordPerfect, which does not.

I get a sinking feeling that your reviewers don't have to turn out actual work and therefore don't know what features are essential in the real world. Maybe their secretaries should do your reviews?

Don Holmes
Hayward, California

Ventura Publisher *does have an exception dictionary, which also functions as a built-in hyphenation dictionary. Although the hyphenation dictionary is small (approximately 300 words), you can customize it with any text editor to add or delete words as necessary.*—Ed.

HYPERTECHNO WHAT?

As someone who came to the computer industry from another field in which people talk funny (medicine), I find that Jim Seymour's article "Why Do Computer People Always Talk So Funny?" (*PC Magazine*, October 13, 1987) points out symptoms of a disease reaching epidemic proportions in our society—a plague that may be even

■ For the novice, computer funny talk presents a tough language barrier to unlock.

harder to cure than cancer, the common cold, or adolescent blemishes. In keeping with the concept of knowing one's enemy, I felt it imperative to advise my fellow *PC Magazine* readers that this infectious threat has been identified. It is the dreaded and highly contagious illness, hypertechno-verbificationism.

Bradford Kidd
Phoenix, Arizona

I thoroughly enjoyed Jim Seymour's article "Why Do Computer People Always Talk So Funny?" Although the technobabble he described is typical in nearly all areas of business, the real source of incomprehension is the legitimate lexicon of the

computer community for those of us still on the outside.

I had hoped that my subscription to *PC Magazine* would help me get inside that community so I could use my AT more effectively and develop its potential. But I am still floundering in a sea of CADs, CAMs, bauds, boots, token-rings, windows, pop-ups, and so on. For the computer novice, the funny talk presents a tough language barrier to unlock.

Norman A. Tippner
Silverton, Oregon

THE REAL COMPUSYSTEMS

In your October 13, 1987, issue you published a brief article about a fraudulent company called CompuSystems Co. of Beverly Hills, California (First Looks, page 36, *PC Magazine*). I would like to inform your readers that my company, CompuSystems Inc., is in no way associated with this company.

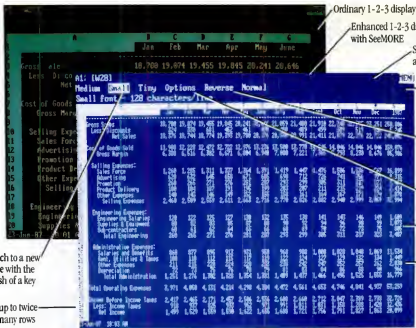
CompuSystems, founded in 1976, is a major supplier of medical insurance processing and billing computer systems in South Carolina. While I do not believe the negative publicity about the California company will hurt our reputation in the medical market, I do feel it may jeopardize the sales of our aggressively priced *File-Copy* tape backup product and our 20-MHz no-wait-state 80386 replacement motherboard for the AT. I only hope that the low prices mentioned in our advertisement (which ironically appeared in the same issue of *PC Magazine*) do not compromise the confusion.

Nexsen B. Johnson
President, CompuSystems Inc.
Columbia, South Carolina

DIVIDED FREEWAY

I was disappointed by the emotional, non-factual way Edward Mendelson reviewed *Freeway Advanced*, our communications software (First Looks, page 43, *PC Magazine*, October 27, 1987). Eager to cast us as Goliath against a shareware David, you made several factual errors.

In fact, you can use long-distance numbers and access codes, there is a chat mode, the Autopilot does replay keystrokes at the speed they were recorded, and *Freeway* does guide its users with context-sensitive on-line help.



Unretouched photo of BGA display.

1-2-3 never looked so good.

Introducing SeeMORE™, a powerful screen manager for 1-2-3® that expands your worksheet view with the push of a key. SeeMORE gives you a choice of compressed formats that double, triple or quadruple the number of cells displayed on the screen.

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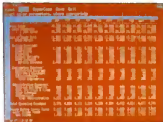


Switch to reverse video.

No special hardware is required to run SeeMORE. All you need is a CGA, EGA, VGA, Hercules or compatible graphics adapter.

SeeMORE manages the screen *without* interfering with the normal operation of 1-2-3. You can zoom in and out as you

build and manipulate a worksheet – you don't need to exit 1-2-3 and switch to a new driver set! And SeeMORE lets you produce hardcopy printouts of any compressed screen with the push of a key.



Change background and foreground colors.

Get SeeMORE and expand your horizons. Works with 1-2-3 Rel 2 on the IBM PC, XT, AT, PS/2 and compatibles. \$79.95. Not copy protected. Symphony version coming soon.

	CGA	EGA/VGA	Hercules
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• Tiny	128 x 33	160 x 58	180 x 58

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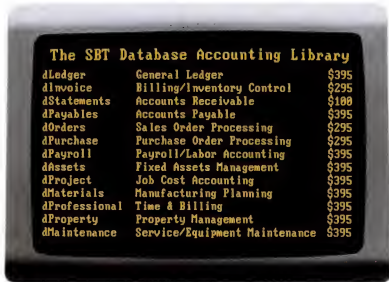
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LT009-10/87

■ LETTERS

This review was not typical of the hard-hitting but objective reviews I expect from *PC Magazine*. I hope you, and your readers, will take a second look.

Philippe Barouk
Vice President, Kortek
Palo Alto, California

As I stated in my review, any dialing prefix used for long-distance calls is also used when making local calls. Also, the program does not include a conventional chat mode, in which the screen divides into separate areas for incoming and outgoing text. And when the program's learning mode plays back keystrokes, it repeats all pauses and hesitations made during initial input rather than playing back at full speed.—Edward Mendelson

A PERFECT FIT

I would like to correct some misinformation concerning the IBM PS/2 Model 25 reviewed in the September 29, 1987, issue (First Looks, page 33, *PC Magazine*). In this review, Gus Venditto wrote that "the most frustrating aspect of the Model 25 is the lack of any hard disk option. Hard disk cards won't fit because they're too wide."

Fortunately, this is not true of the Plus Development HardCard 40 or HardCard 20. Plus HardCards are the thinnest drives available, and their compatibility in the Model 25 makes this machine a very cost-effective solution for a wide range of serious applications.

William Matlack
Plus Development Corp.
Milpitas, California

I stand corrected. In fact, a Plus Development HardCard 40 is one of the hard disk cards I tried to install into the Model 25. Being conservative in nature, I stopped when the card touched the bottom of the monitor as I closed the chassis. Plus Development later informed me that this is no cause for concern, and I did succeed in installing a Plus HardCard after the review was written.—Gus Venditto

CAN'T COME TO TERMS

In "Coming to Terms with OS/2" (From the Editor's Screen, *PC Magazine*, October 27, 1987), Bill Machrone quotes Charles Petzold on the disinforming regard-

ing OS/2. Mr. Petzold asks, "Why don't these people boot it up and find out?" to which Mr. Machrone responds, "I'm baffled as to why everyone is still speculating about OS/2 when beta copies are everywhere. They come with the Software Development Kit."

Well, count me among the disinformed. I can't speak for everyone, but the reason I don't boot it up and find out is because the Software Development Kit costs \$3,000.

George Gianopoulos
Orange, California

CORRECTIONS/AMPLIFICATIONS

WordPerfect Corp.'s *PlanPerfect* does have a learn mode for macros and a cell-protection feature accessed through the Alt-F7 key. *PlanPerfect* can also enter cell data with the cursor keys ("Challenging 1-2-3 on Price and Power," *PC Magazine*, October 27, 1987).

Because of a printing problem, the BASIC listing of the SNIPPER.COM utility (Utilities, *PC Magazine*, October 27, 1987) had some lines containing unreadable data. A legible reprint of the affected lines is in this issue's Utilities column.

Arthur Andersen & Co. does not develop in-house accounting software for its clients ("Automating Your Books, Analyzing Your Options," *PC Magazine*, September, 15, 1987).

The correct phone numbers for Sinter Corp. are (800) 822-1596 and (201) 662-7999 ("Analyzing Data from All the Angles," *PC Magazine*, October 27, 1987).

HOW TO WRITE TO PC MAGAZINE

Do you have a comment, compliment, or criticism about something you've read in *PC Magazine*? A question you'd like to open up to other readers? Then send your opinion to Letters to *PC Magazine*, One Park Avenue, New York, NY 10016, or through MCI Mail to PCMAGAZINE.

All letters become the property of *PC Magazine* and are subject to editing. We cannot publish letters that do not include a name, address, and phone number for verification. We're sorry we're not able to answer letters personally. □

"Almost every local user group and bbs maintains a library of public domain [and shareware] software..."

"Unfortunately, many of these collections can be overwhelming, especially for users who are not familiar with the entries. The Public (Software) Library may provide an alternative with its large collection arranged on disk by category."

The library is regularly updated and cleaned out and documentation added or improved when necessary. The library's copying and handling charges are also among the lowest of any group.

—Steven Rosenthal, *PC Week*
September 11, 1985

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10 BIG REASONS IT'S TIME YOU CHANGED YOUR EDITOR TO BRIEF

1 FUNDAMENTAL TRUTH. If you are a programmer, you use your editor more than any other tool. If it isn't the best, the fastest, the most versatile, the most productive... well, then neither are you!

2 OUR ENTHUSIASM. While we do not publish BRIEF we wish we did. We sell so many BRIEFs that we've been advertising it not-stop since it was introduced two years ago. We're not alone in our enthusiasm. There is no end of accolades from other admirers.

BRIEF Encounters

"The word is getting around... that BRIEF is simply the best text editor you can buy" John Dvorsik in *InfoWorld*

"In the last five years, only a handful of applications have altered the way we use microcomputers. The winner impact is surrounding BRIEF is a 'water' that will most definitely change the way we develop application software. Data Based Advisor

"Overall, BRIEF is an excellent and efficient editor with capabilities that are truly useful. If you're a serious programmer or developer of commercial applications, the BRIEF package is one of the best investments you can make." *PC Magazine*, 7/86

"Every time I've mentioned text editors I've got a raft of mail urging me to try Brief. Now that I've tried it I see why it has windows—boy, does it ever have windows! It will do just about anything you want it to... look no further, recommended." *Jerry Pourcelle*, *Byte* 12/86

Best editor of 10 compared.
Dr. Dobbs's Software Tools

3 WINDOWS ON THE WORLD. Why the excitement? First, BRIEF's architecture. Any number of files of virtually any length can be open. (Start BRIEF with `*.*` to prove it.) Open as many tiled windows as fit the screen—over/under and side-by-side—to work on any of your files. Open, close, and resize windows as you go. In each window, full screen or tiny, all editing techniques are at hand—high-speed cut/paste, paging up and down, horizontal scrolling, optional word wrap. Load the same file in any number of windows to view different areas simultaneously. A change in one changes all. Cut and paste text blocks between windows and files, or into buffers for later recall. All files stay in memory, so you can always go back to skip some more.

4 WHOLLY MACROS. Much of BRIEF was written in its own macro language. It is that powerful! The language and its compiler come with every copy, as do many standard macros, with source code for learning by example. It is a complete language with conditionals, loops, recursion, global and local variables, even data types. It can control files, windows, and the keyboard. It has structure, 32-character variable names, and—not at all like 1-2-3's—cuneiform—is entirely readable like a hybrid of LISP and C. With it you can develop a library of routines to power BRIEF your way.



5 UNDO. NOT UN-DELETE. Don't confuse the two. BRIEF doesn't just keep snapshots of recent deletions should you want to pick them up from the cutting room floor. It can reel the whole film backward undying any command that affected the cursor or text. Watch a undo a global replace, for example. Unscannily it can back up 300 lines, all the way to the beginning of a session. "Works like a dream," said *The C Journal*.

6 SHELL GAMES. Leave BRIEF, run your compiler, print out the error messages, load up BRIEF again? No way! Run your compiler from inside BRIEF! It will point to each error line in your source program, still loaded in memory, for immediate editing. You don't have to leave BRIEF to use DOS either. BRIEF disappears from the screen to get out of your way, but say bye to DOS and BRIEF pops back to the screen, as do all the files you were working on.

7 KEY WHIZ. You can reassign BRIEF's command keyfruits to whatever keys you're used to, even your old editor's, so you don't have to send your fingers back to school. Macro execution can be assigned to single keys. Or you can tell BRIEF to listen while you tap out a complex routine. It will save and playback faithfully, a shortcut macro without a single line of coding.

8 MULTI-LINGUAL. BRIEF's macro language is perfect for writing formatters for your language which indent, match up parentheses and brackets, and set up statement templates for fill-in. BRIEF comes with C language support already built in. Others have written macros to format Pascal, BASIC, LISP, Prolog, FORTRAN.

9 QUICKER PICKER-UPPER. Looking for something? BRIEF has full UNIX*-like expression search tools to locate and find and fix any file in memory. Literal strings with wildcards and "?" character marking, sure. But also indifference to case or intervening characters, (aeiou) to match all vowels, or [-aeiou] to match anything but vowels, [a-l-m] to match character ranges, beginning or end of line searches, even multiple choice pattern matching and replacement.

10 REASONS 11 THROUGH 20: 11, BRIEF comes with a color option. You can select your own color scheme anytime. 12, It supports EGA's 43-line

dBRIEF. The Power Environment for dBASE Programming

Many worthy utility products supply needs that dBASE's programming language doesn't—dUTILM, dFLOWTM and a host of others. Trouble is, you have to use them separately, then combine their output into your dBASE program files.

No longer. dBRIEFM, written in BRIEF's macro language, grabs hold of BRIEF and turns it into a complete dBASE III and III Plus programming domain. Using BRIEF's underlying alert capabilities and its own interfaces, dBRIEF can run external utility libraries plus dBASE itself, and link to the ClipperTM, Foxbase+TM and QuicksilverTM compilers, all with dBRIEF still loaded and running the show. It can do what BRIEF already does plus:

- Convert a screen layout into dBASE code for interactive data entry
- Display dBASE file structures in windows a great convenience alongside your program files
- Expand keystrokes into full dBASE statements
- Indent automatically for clog: display
- Create databases, index files, invoke Ashton-Tate's dFORMATM and dCONVERTM, draw lines and boxes

Simply marvelous programming environment for writing and editing dBASE programs. *PC Magazine*, 7/86. Source code included!

Requires BRIEF 1.32 or later and 384K, 512K to run. dBASE within dBRIEF, 404K and harddisk recommended.

mode and can display up to 128 lines long. 13, Full 8-bit ASCII display, the whole character set can show on screen. 14, Full path support. 15, Command line start-up flags to modify BRIEF's behavior, change a path name, or run a macro for example "wp" which turns BRIEF into a word processor with wraparound and margin setting. 16, Automatic file save during idle moments. 17, Compatibility with most stay-resident programs (like SedexTM), multitaskers (like Microsoft WindowsTM), and networks. 18, A bulletin board with public domain macros contributed by a mushrooming cult of macromaniacs. 19, No copy protection. 20, Context sensitive help, and phone support from the publisher.

* Brief needs 128K normally. 320K for complete feature. * Product must be returned in resalable condition.

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dGRAPH is a graphics system that produces bar, pie, line, and pie-bar charts directly from dBASE data. Dozens of op-



tions (or you tailor graphs to your needs). APPLICATIONS PLUS is 100% compatible with Clipper and FoxBASE+.

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CLIPPER From Nantucket

Compile dBASE for Speed, Protection

Clipper™ turns lumbering dBASE® into a speed dMON with benefits both in its wake. Your source code is safeguarded from public view, you can distribute your compiled application without royalties, and your customers don't even need copies of dBASE. The Spring '87 Clipper offers direct file compatibility with dBASE III Plus, and network link capabilities to run compiled programs on major networks supporting DOS 3.11 with no restrictions on number of users. Clipper offers arrays, menu-building commands,

user-defined functions, context-sensitive help techniques for applications, a debugger, and it supports Expanded Memory. It goes well beyond dBASE with 1,024 fields per data base and 2,048 active memory variables.

Clipper has the power to save and restore multiple screens to and from memory variables. You can also create overlays, call object modules compiled in other languages, and create function libraries to link with your applications. Power and flexibility make it the #1 dBASE compiler. Lot \$699 PC Brand \$375

McMAX From Nantucket

Like dBASE for the Macintosh

McMAX is like running dBASE on the Macintosh. It combines an easy-to-use menu-driven ASSIST mode under the Mac interface, an interactive command mode like dBASE at the dot prompt, and an application programming language fully compatible with dBASE III. It gives you the power to create dBASE language applications on the Macintosh and transfer back and forth to the IBM® world. McMAX accommodates up to 36 million records, 32,000 characters per record, 255 characters per field, and up to 32 files open concurrently. No copy protection. Lot \$296 PC Brand Call

dBC Identical dBASE III Plus Files Using C

dBC™ is a series of C libraries from Nantucket which creates and updates data files identical to those of dBASE. So dBASE can read and update the files too.

More than that, it means both C and dBASE applications can operate on the same data bases interchangeably. It means C programmers can interface with the big market of dBASE users out there, yet side step the dBASE language. It means dBASE applications can now be linked to the universe of C libraries and tools to add modems, graphics, statistical analysis, all the things dBASE cannot do. It means the speed and power of C to impress clients accustomed to dBASE. dBC's functions permit all dBASE's file handling commands many recompiled

to permit direct data manipulation. Ten each of data, index, and memo files may be open at once. It is complete an ISAM package that you can forget dBASE and use dBC only for C programming.

Our versions of dBC source file formats for dBASE III and III and now dBASE III Plus make your programs network ready, as many stations as a network allows. Reads-off mode handles record and file locking and unlocking automatically. Closes in functions give you direct lock/unlock control.

Supports all four memory models. Supports compiler and dBASE version. For dBASE III, Lot \$290 Ours \$196 For dBASE III Plus Lot \$790 Ours \$596

Pay double and you get source too!

WALLSOFT'S THE UI PROGRAMMER

Code generator for dBASE

The UI Programmer was developed for professional dBASE programmers who have been frustrated in the past by code generators. Up until now, a serious dBASE programmer had to take whatever code a generator produced and modify it to their needs. With UI, the developer can generate exactly the dBASE code wanted.

UI (User Interface) has two main functions: the first is a powerful forms editor to create sophisticated screens and menus from a matter of minutes. The editor is completely menu-driven. It works on the "point-and-shoot" principle—just put the cursor where you want and tell UI what to put there.

UI's other, more important, main function is generating code for the forms

you've designed. Once you have a form the way you want it, you call up the "Generate" menu, and tell UI which template you want to generate the code with. That's the key—each template tells UI to produce a different kind of dBASE program.

It's through these templates that you can program the way UI generates source code. You can use the templates that come with UI ("as is" (there are about 25 of them), completely rewrite them, or write your own. So you don't lose control of design, like you do with other generators. You just let UI do the tedious work.

	Lot	PC Brand
UI	\$299	\$244
DOCUMENTOR	\$149	\$244
dFLOW	\$299	\$124
DATA-p	\$ 60	\$ 90

dBASE AT THE SPEED OF C

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For example, a dBASE III accounting program ran 50% faster and a large Condor 3 database whose SORT time was 80 minutes, ran the same sort under Overdrive in 13.

Overdrive is not a disk cache, an optimizer or a RAM disk. In fact, Over-

drive will run even faster on your RAM disk because Overdrive eliminates the DOS "thinking time" not the disk time. Overdrive hooks itself into DOS and replaces its old slow program code with modern, efficient, well-designed routines.

Overdrive adds handy directory utilities and improves the speed of DOS backup and copy functions remarkably. Runs transparently and takes up only 2KB of RAM for itself plus around 1/2KB per Megabyte of hard disk capacity.

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■ MITT JONES

PC ADVISOR



Help in finding multilingual spelling checkers and word processors, in choosing a genealogy package, and in studying up for the GMAT exam.

ROOTS

I am interested in plotting the genealogy of my family. Please recommend a program that would not only include a database but would also graphically indicate various generations.

G. Simon, M.D.
London, Ontario
Canada

Personal Ancestral File (\$35; Distribution Center, South Salt Lake City, Utah; (801) 531-2584) is by far the most powerful genealogy package we've seen for the PC.

Developed and sold by the Mormon Church, Personal Ancestral File is easy to use and designed to minimize the amount of disk space your records require. You've got your choice of several forms of output, including pedigree charts, family group records, and descendant charts. The program also includes a handy utility that calculates the relationship between any two people in your ancestral records.

THE FRENCH CORRECTION

Spelling-checker programs for documents in English are now quite common. I would like to buy one that works for documents in French but have not been able to find one advertised anywhere.

Paul Shewmon
Columbus, Ohio

WordPerfect Corp. (Orem, Utah; (801) 225-5000) offers eight foreign-language spelling checkers as optional features of WordPerfect, Version 4.2. In addition to French, you can purchase dictionaries in

Donish, Dutch, German, Icelandic, Norwegian, Spanish, and Swedish.

The dictionaries, which retail for \$60, integrate well with the English version of WordPerfect and use an English interface.

If you don't happen to use WordPerfect, however, you'll want Polygot Inc.'s Jet: Spell (Boulder, Colo.; (303) 449-7002). Now up to Version 3.0, Jet:Spell offers standalone spelling checkers in 11 languages: American English, British English, Danish, Dutch, French, Canadian French, German, Italian, Norwegian, Spanish, and Swedish. The Multilingual version of Jet:Spell, which includes one dictionary of your choice, lists for \$109.95. Each additional language costs \$59.95.

Regardless of which route you choose, you'll need an EGA- or Hercules-compatible adapter to display all the foreign-language characters on your screen.

As a final note, Microsoft offers multi-

lingual dictionaries for Microsoft Word, Version 4.0, but the dictionaries are available only outside the United States with the purchase of a foreign-language version of Word.

NOT GREEK TO THEM

We have been looking for a word processing program or call-up program that allows the use of Greek and Ancient Hebrew characters. We need this capability for Biblical studies. We are currently using WordPerfect and would like to stay with that package if possible.

Richard A. Claridge, P.E.
Titusville, Florida

WordPerfect Corp. publishes several foreign-language word processors (the same languages offered in WordPerfect dictionaries), but Greek and Ancient Hebrew are not among the languages supported.

Turbofonts (\$189; Image Processing Software Inc., Madison, Wis.; (608) 233-5033) adds 30 predefined character sets to WordPerfect and most other word processors. In addition to including many special characters used in mathematics and the sciences, Turbofonts supplies alphabets for Western, Eastern European, and Baltic languages and Classical and Modern Greek, Russian, Hebrew, and Arabic. The Ancient Hebrew and Greek alphabets come complete with vowel points. A relatively new enhancement allows you to enter text right to left on the screen, but Turbofonts does not provide reverse-order word wrap.

If you're open to learning a new word

■ **WordPerfect Corp.**
offers eight foreign-language spelling checkers as optional features of WordPerfect, Version 4.2.

■ PC ADVISOR

processor, consider making the change to *Nota Bene* (\$495, available to graduate students for \$275; Dragonfly Software, New York, N.Y.; (212) 334-0445), undoubtedly the most foreign-language-af-fluent mainline word processor available for the PC.

You've got several language supplements to choose from with *Nota Bene*. The *Complete Languages Supplement* runs \$195 and includes alphabets for a wide range of languages, including Asian and Slavic languages. For \$95, you can opt for any of five subsets of the complete supplement, one of which is tailored to Biblical studies.

Nota Bene allows right-to-left text entry and handles reverse-order word wrap well. You can also change easily from one language to another at any time and display more than one alphabet on the same screen.

As with the foreign-language dictio-

■ *Nota Bene* allows right-to-left text entry and handles reverse-order word wrap well.

naries, you'll need either an EGA- or Hercules-compatible system to display the foreign-language alphabets. Turbofonts supports most popular printers, but *Nota Bene's* foreign-language supplements drive only a select few printers.

CRAMMING ON-LINE

After working in the field of business for several years, I've decided to go back to school to get an M.B.A. However, before

I do so, I must take the GMAT exam. There are plenty of books to aid in taking the test, but I'm interested in a tutorial package on-disk. Are you aware of any?

Kim Wilson
Alameda, California

Such a product is available, marketed by none other than the Educational Testing Service (Princeton, N.J. 08541; (609) 921-9000)—the same folks who compose the GMAT. You may want to think twice before you dish out the \$79.95 price of The Official Software for GMAT Review, however. Turn to *After Hours* in PC Magazine's October 13, 1987, issue for a look at what the package offers.

ASK THE ADVISOR

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FIRST LOOKS

Turbo Pascal 4.0 Links Code Past 64K, Lacks Debugging

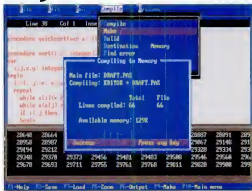


HANDS ON

BY STEPHEN RANDY DAVIS

Until now, upgrades to Turbo Pascal have kept the same "look and feel" as the original. With Version 4.0, however, Borland International has brought the aging Turbo Pascal back up to the standards of its other Turbo languages.

The omnipresent RAM-resident editor is here, with the command menu across the top of the screen, and a separate command-line compiler is included for those grown weary of windows.



The same interactive environment that is found in Borland International's Turbo Basic and Turbo C is now available in Turbo Pascal.

As you investigate Turbo Pascal 4.0, you will notice how much compatibility it maintains with predecessors. Do not be confused—this is a much-improved language. Most importantly, TP4 has a link step. (It is during linking that object files created during the compilation of different modules are combined into one executable program.) Since Turbo Pascal historically skipped this step, Turbo modules could not make calls to modules of other languages. TP4 puts these problems behind.

Although TP4 understands .OBJ files from other lan-

(continues on page 34)

ATronics' Low-Cost PIB Takes The Sting Out of Video Capture



HANDS ON

BY MITT JONES

Capturing and storing live color video images from a video camera is one of the more-fantastic feats an appropriately equipped PC can perform. But the fantastic cost of equipping a PC with an image capture board has kept many would-be users out of the market.

ATronics International has gone a long way toward changing all that with its new Professional Image Board—an impressive image capture board that boasts many of the features

of Truevision's (formerly AT&T EPICenter) TARGA boards for a fraction of the cost.

Based on the Texas Instruments 34010 graphics processor, the PIB comes bundled with ATronics' own image capture and editing software, plus *Halovision II*, a powerful, icon-based paint-and-edit program from Media Cybernetics. The PIB retails at \$799. The two comparable Truevision boards, the Image Capture Board and the TARGA 16, list for \$1,295 and \$2,995, respectively, and ship with only a limited image editor.

Like the ICB and TARGA

16, the Professional Image Board supports image capture, store, and recall, with simultaneous display of 32,768 colors. Its 512- by 256-pixel resolution—compared with 256 by 256 for the ICB and 512 by 482 for the TARGA 16—makes it less than ideal for high-end applications but more than adequate for picture databases, desktop publishing illustrations, and other low-end uses.

The PIB accepts input from an RGB camera or any NTSC-standard composite device, such as a VCR camera. ATronics designed the board to display

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Turbo Pascal 4.0

(continued from page 33)

guages, it is when talking to object files of its own making, known as "unit files," that it really shines. These unit files contain not only the code from the module but also procedure and type definitions, constants, and an initialization routine. Thus a module can strictly define its entry points, plus any constants that it intends to use.

Another problem with previous versions of Turbo Pascal was the 64K limit on code size. This is no longer a consideration: although individual modules are limited to 64K in size, TP4 can create programs as large as available memory. Since chaining and overlays are no longer necessary to sidestep the 64K limit, TP4 no longer supports them.

TP4 has not forgotten the features that made Turbo Pascal

famous in the first place. Compilation can still be directed either to disk or directly to RAM for speed. Borland claims an increase in raw compilation speed of up to three times that of Version 3.0. In addition, TP4 no longer stops compiling with the first error it finds; instead it sniffs out errors in the entire source file.

Inline assembly is still available and works the same way. Added are inline procedures that expand in place, much like a macro definition in assembly language. Include files may now be nested up to eight levels deep. Also added is conditional compilation. Enclosing a section of code in `{IFDEF label}` and `{ENDIF}`, for example, will cause TP4 to ignore that section if the label is not defined.

I used one of my favorite TP3 utilities to test compatibility. First, I ran it through the

Upgrade utility that Borland supplies for making required changes and suggesting other problem areas. Upgrade made a series of minor changes and added six notes pointing out problems that it couldn't handle by itself. After making these fixes, I quickly ran through the build step: no compilation or linkage errors. Miraculously, the program ran without a hitch, albeit somewhat faster than before. Elapsed time: 10 minutes.

Debugging is still a problem with TP4, as no debugger is included. Since TP4 can now generate load maps, third-party debuggers such as Pfix, Symdeb, and Periscope can be used on TP4 programs. This is quite a bother, however, as it forces you to leave the environment for program testing.

Overall, I give TP4 high marks. The absence of a debug facility is a flaw that's not easily understandable in such an other-



FACT FILE

Turbo Pascal 4.0

Borland International Inc.
4585 Scotts Valley Dr.
Scotts Valley, CA 95066
List Price: \$99.95; upgrade, \$39.95.

Requires: 256K RAM, one disk drive, DOS 2.0 or later.
In Short: Major enhancements include linking, compiler directives, and an end to the 64K program size limit. A debugger is sorely missing, but compatibility with Turbo Pascal 3.0 is high. Not copy protected.

CIRCLE 448 ON READER SERVICE CARD

wise complete package. Even so, TP4 brings Pascal back into the realm of serious development languages.

Image Board

(continued from page 33)

images on the NEC MultiSync (set to analog mode) and compatible monitors, but it can also output a standard NTSC signal to a television or VCR. The board also has genlock ability.

We tested the PIB with a MultiSync as the PIB display and a Panasonic composite camera as the video source. For the most part, the PIB operated as expected and captured images with impressive quality.

However, compared side by side with images captured and displayed via the TARGA 16, the PIB images lose some of their appeal. The difference in picture quality is mostly because of the TARGA's higher resolution. But the TARGA's colors also seemed more true. Our evaluation board, an early production unit, generated barely perceptible green streaks across the display, which also detracted somewhat from the overall quality of the PIB images.

At the time that this issue went to print, ATronics was able to name for publication only a few applications that will be supporting the PIB—Halovi-

sion II, PicturePower, and a new image database interface to dBASE III. But *Halovision II* can save PIB capture files in .CUT, .PIC, .TGA (TARGA TIPS), and .TFF formats, all of which many high-end paint packages and desktop publishing packages can import.

The bottom line? If you want a state-of-the-art image capture board suitable for high-quality studio production, go with Truevision's \$5,995 Vista (see

First Looks, page 34, *PC Magazine*, October 27, 1987). With 16 million colors at a 1K by 1K resolution, the Vista clearly leads the field. If your wallet is about half that fat but image quality and manipulation still take top priority, go with the TARGA 16. Its hardware zoom and panning, not to mention its heightened resolution, give it a clear edge over the PIB.

But for applications such as picture databases or newsletter



FACT FILE

Professional Image Board

ATronics International Inc.
1830 McCandless Dr.
Milpitas, CA 95035
(408) 942-3344

List Price: \$799

Requires: Hard disk drive (40MB or more recommended); analog RGB monitor or television with video signal input jack; video camera, VCR, or other video device capable of generating a standard NTSC composite or RGB analog signal; DOS 2.0 or later.

In Short: An inexpensive image capture board that supports display of 32,768 colors at a resolution of 512 by 256 pixels.

CIRCLE 454 ON READER SERVICE CARD



ATronics's Professional Image Board is bundled with *Halovision II* image editing software. This image was filmed with a video camera and passed "live" into the PIB and displayed on a NEC MultiSync; images can also be captured from videotape.

illustrations, the ATronics Professional Image Board offers more-than-adequate performance at a ground-breaking price. Applaud Truevision for pioneering color image capture boards for the PC, but thank ATronics for making the technology widely affordable.

Photograph: Thane O'Connor

Five-Piece Microsoft Works Is More Than the Sum of Its Parts

PC HANDS ON

BY CHRISTOPHER BARR

Microsoft Corp.'s analogy for *Microsoft Works*, its \$195 integrated package, is the ubiquitous Swiss Army knife: tools for the foot soldier. These *Works* tools include a sharp word processor, an average spreadsheet with average graphics, a dull database with reporting, and weak communications. *Works*'s

and easy to use. Copying and moving text is done with block marking. Characters can be formatted for bold, underline, italic, subscript, superscript, and strike-through, but even though *Works* uses color, only high-contrast white displays formatted characters on-screen.

Although not WYSIWYG, *Works* can show double-spacing, left and right indents, and page breaks on-screen. The printer support is superb—

perform mail-merge functions with a database file.

The spreadsheet has 256 columns and 4,096 rows that are labeled with a .WKS suffix. *Works* can read a Lotus 1-2-3 .WKS file, but it's not 100 percent compatible. The program converts 1-2-3 formulas to the *Works* format when you import the file, and 1-2-3 can read the *Works* file, formulas and all. *Works* has a full battery of functions on a par with 1-2-3 but without any of 1-2-3's data functions. *Works* has no macro language and certainly can't read 1-2-3's, but *Works* comes with MS-Key, a RAM-resident macro utility similar to *ProKey*.

Works's easy charting options are nothing short of terrific. When you're in a spreadsheet you can define a block, and *Works* will automatically create a standard bar chart. There are eight graph types, and *Works* stores the graph in the spreadsheet; each sheet can store eight graphs.

The database is a standard flat-file data manager. You design your own input screens and place fields wherever you like. Input forms can be up to eight pages long, but each database can have only 4,096 records. *Works* sorts on up to three fields and can perform queries using wildcards or logical operators. When you list a compiled *Works*

FACT FILE

Microsoft Works

Microsoft Corp.
16011 NE 36th Way
Box 97017
Redmond, WA 98073-9717
(800) 426-9400
(206) 882-8080
List Price: \$195

Requires: 384K RAM, two 360K floppy disk drives or one 720K floppy disk drive, DOS 2.0 or later. Hard disk drive, graphics card, mouse, and modem recommended.

In Short: A low-end, truly integrated package with word processing, spreadsheet, database, and communications. Not copy protected.

CIRCLE 448 ON READER SERVICE CARD



Microsoft *Works*' pull-down menus make it easy to select print attributes. Hinting the "p" of "Plain Text," for instance, enables regular type, as opposed to bold or italic.

great strength is not to be found in these modules individually but in the symbiosis of all the pieces working together.

You can have up to eight files open at the same time. That means any combination of word processing, spreadsheet, and database files can be loaded into RAM, letting you pop from file to file quickly. Modules work interactively, too, letting you drop a chart into a document or move a database file into the spreadsheet. You can start the communications module and leave it open while you work in another module, but since there is no background communications facility, you can't download a file in the background and work on another in the foreground.

The word processor is by far the strongest of the four modules. It's a fairly standard editor

Works lets you select any font in your printer from a menu. As with *Microsoft Word*, you set margins in inches, not characters or columns. You can check your spelling with *Works*'s 80,000-word dictionary and

Microsoft Works: A Poor Man's OS/2?

One of the cornerstones in IBM's long-range planning is SAA, a consistent interface for software, whether it's running on a PC, minicomputer, or mainframe.

SAA (systems application architecture) is a rule book for programmers. It aims to create a future in which applications will have internal hooks that will let them easily communicate with each other and users will be able to sit down at a new program

and feel comfortable in a matter of seconds.

Among the rules for interface design: program functions are chosen through menus in which each function is called by a unique letter that is highlighted by a different color or reverse video. For instance, in any SAA program's main menu, Alt-F-O opens a file and Alt-T selects a formatting menu.

All this matters little to satisfied users who are happy with

their favorite programs and those command structures. But companies that support dozens of users may find the simplicity of training them to use one interface very appealing.

OS/2 will conform to SAA interface specs, as do *Microsoft Windows*, Version 2.0, and *Microsoft Windows/386* already. But these are programs for powerful computers.

Microsoft Works is the first program bringing the full SAA interface to first-generation PCs and XT's. —Gus Venditto

Byline: The \$295 Ashton-Tate Desktop Publisher Is Mouse Free

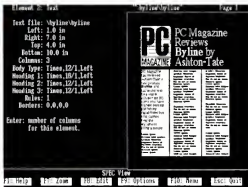
PC HANDS ON

BY DIANE BURNS
AND S. VENIT

One of the problems that most PC users find in adding a desktop publishing package to their systems is that they must also add more cards and chips to support a graphical interface and a mouse. While graphical operating environments and mice may be the wave of the future, many experienced PC users are more comfortable using keyboard commands than a mouse.

With its new desktop publishing package, *Byline*, Ashton-Tate has given PC users the chance to produce high-quality documents without literally mousing around.

Byline uses familiar commands and keyboard sequences to lay out a page, complete with multiple columns and graphics. Like other leading desktop publishing packages, *Byline* allows text to be edited, but it is primarily intended to be used with existing word processing files. Unlike most desktop publishing



Byline offers a choice of views: Photo View, for full-screen graphics editing; Spread View, to see two full pages at once; Zoom View, for a cleanup of half the document; and, above, Spec View, with page specifications and a WYSIWYG page display.

packages on the market, *Byline* is driven by a series of menus that appear on-screen adjacent to a WYSIWYG, noneditable preview of what the page will look like when printed.

Byline uses a series of menus for specifying the attributes of an entire page and for individual paragraphs of text and graphic elements. The Page Spec menu

lets you designate the number of columns and margins on a page, as well as left and right "master" pages—templates that contain information that will appear on every page, such as page numbers.

Individual paragraphs of text can be formatted using the Element Spec menu, which defines the location and size of the area on the page that the text will occupy, the font, the number of columns, and the width of borders or ruled lines that may appear around the text element.

Byline supports the file format of a number of popular word processors, including *MultiMate Advantage II* and *MultiMate Advantage*, Versions 3.6; *WordPerfect*, Versions 4.1 and 4.2; *WordStar*, Versions 3.3 and 4.0; *XyWrite II* and *III*; and *ASCII* text. *Microsoft Word* is the only major word processing package not supported directly. Formats such as boldface and italic that are specified in supported word processors are maintained when imported to *Byline*.

One area in which this product is unique among its competitors is its ability to merge with *dBASE III* files to produce documents like form letters, invoices, and directories. *Byline*

also supports importing of files from *Lotus 1-2-3* and *Symphony*, including both spreadsheet data and charts.

Byline offers adequate handling of graphics imported from other programs, allowing you to resize, crop, or relocate a graphic once it has been brought onto the page. *Byline* supports graphics from *PC Paintbrush*, *MacPaint*, and *Windows* and scanned images in the *PC Paintbrush* .PCX format. This includes images produced by Hewlett-Packard's ScanJet and scanners from Microtek, Datacopy, and Dest.

Supported printers include Hewlett-Packard's LaserJet or LaserJet Plus (with the B or F cartridge only), the LaserJet Series II, Okidata's laser printer, and PostScript printers, including Apple's LaserWriter. We tested *Byline* with the LaserJet Plus and found the speed performance to be quite satisfactory.

Byline is backed by Ashton-Tate's customer support, which includes 90 days of free, unlimited telephone support to registered users. Following that, you may sign up for a \$50 package for 10 calls or pay \$80 per year for 20 calls.

Byline is a good value for the price, and it may be just what hard-core PC users have been looking for to answer their desktop publishing needs.

We used a Hewlett-Packard LaserJet printer to print out the sample page on the right. The scanned-on logo would have benefited from editing in PC Paintbrush. Only five fonts—Times, Courier, Swiss, Bookman, and dBase Elite—are available with Ashton-Tate's *Byline* desktop publishing package. This sample uses the Times font.



PC Magazine Reviews Byline by Ashton-Tate

PC Magazine has reviewed Ashton-Tate's new product *Byline*, and has found it to be a viable solution for PC users who have wanted desktop publishing capabilities but who cannot bear the thought of using a mouse.

Learn more about *Byline* in our special report. *Byline* is available for PC users who have wanted desktop publishing capabilities but who cannot bear the thought of using a mouse.

Learn more about *Byline* in our special report. *Byline* is available for PC users who have wanted desktop publishing capabilities but who cannot bear the thought of using a mouse.

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PC FACT FILE

Byline

Ashton-Tate
20101 Hamilton Ave.
Torrance, CA 90502
(213) 329-8000
List Price: \$295

Requires: 384K RAM; two disk drives; CGA, EGA, AT&T graphics adapters; DOS 2.0 or later.

In Short: *Byline* is a solid desktop publishing package that does not require the use of a mouse. Recommended for those who hate mice. Not copy protected.

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HP's \$2,495 Vectra Portable CS Poses No Threat to Toshiba

PC HANDS ON

BY NORA GEORGAS

In an era of notebook-size DOS portables and lightweight 286 and 386 laptops, Hewlett-Packard Co. should have known better than to introduce an 18-pound 8086-based behemoth with the dimensions and styling of a teenager's record player, circa 1962.

The HP Portable Vectra CS is a study in wasted space.

The machine's hard-to-read 12-inch LCD screen is adrift in a beamy 17-inch lid, leaving an enormous landscape of corrugated plastic—punctuated only by two pop-out floppy disk holders. (Isn't this what shirt pockets are supposed to be for?) The 1.44MB 3½-inch disk drives also pop up from under a panel on the front of the machine—a nice arrangement, but the space is so big you could serve dinner for four on it. Still on the top, at the right side of the machine, is a handy gauge to tell you how much battery life you've got left—also nice, but surrounded by a 4- by 6-inch plastic wasteland.

The Vectra's screen snaps off to make it easier to connect the chassis to a regular, full-size monitor, which is probably the only way around the pitiful LCD screen: its washed-out blue-on-green display is a throwback to the old days of calculator-style display. No backlighting or supertwist technology here—just dim LCD.

The keyboard features a decent layout with full function keys (AT fashion, across the top of the keyboard) and separate

numeric keypad. The keyboard feel is rather light—surprising for such a zaffig piece of hardware.

Overambitious pricing is the final insult. At \$2,495 for the dual-floppy-disk-drive model and \$3,595 for a machine equipped with a 20MB hard disk. The Vectra is more expensive than many of its smaller and sometimes more-powerful competitors.

The bottom line is, this machine is really too big for true

Hewlett-Packard's Portable Vectra CS is most notable for its wide expanse of plastic case and a very dim LCD screen.

The computer runs on an 8086 microprocessor and has two 3½-inch disk drives that pop up from under a panel.



PC FACT FILE

HP Portable Vectra CS
Hewlett-Packard Co.
3000 Hanover St.
Palo Alto, CA 94303
(415) 857-1501

List Price: With two 3½-inch floppy disk drives, \$2,495; with one 20MB hard disk drive and one 1.44MB floppy disk drive, \$3,595; EMS adapter with 1MB RAM, \$995; EMS adapter with 2MB RAM, \$1,795; 1,200-bps modem, \$450; 2,400-bps modem, \$695; HP Vectra DOS 3.2, \$95.

In Short: A big, awkward portable computer with no extra performance or features to justify its size and price.

CIRCLE 436 ON READER SERVICE CARD

laptop use. You would have a great deal of trouble using it, say, in an airplane seat.

Clearly, this machine was not built with the traveler in mind. But it's not clear who would be willing to put up with a machine so far behind current technology. The extra space and weight aren't justified by any particularly outstanding gains in features, performance, or price. Put another record on the turntable, HP.

Okidata Dials Into Modem Market

PC HANDS ON

BY HOWARD MARKS

Okidata has been long known in this country for "industrial-strength" printers for personal computers, but its Japanese parent company, OKI Electric, has been making a wide range of electronic products and components, including telephone systems and other communications gear, for an even longer period. OKI is combining the reputation of its American printer division with the communications experience of OKI Electric by introducing a series of modems

under the Okidata name.

The Okitel 2400 is a solidly built, Hayes-AT-command-set-compatible, 2,400-bit-per-second modem without error correction or any other special features to differentiate it from the many other 2,400-bps modems that are now on the market. It has the usual complement of indicator lights and controls and it even supports the CCITT V.22 modulation scheme used overseas.

The modem sports a sleek, streamlined design with large indicator lights. The Okitel always performed flawlessly even when I used it with Carbon

Copy and Hayes's own Smartcom II and III, which are notorious for not working with "Hayes-compatible" modems (some versions of Smartcom II even check to see how quickly the modem returns the OK before it will work properly). I was also quite pleased with the Okitel's fine performance on long-distance calls to bulletin boards and MCI nodes around the United States.

The Okitel 2400 is a fine if undistinguished product that has excellent Hayes command set compatibility. You should consider it if you can buy it at a good price, if your dealer will

PC FACT FILE

Okitel 2400
Okidata
532 Fellowship Rd.
Mount Laurel, NJ 08054
(609) 235-2600

List Price: \$549
Requires: Serial port, communications software.

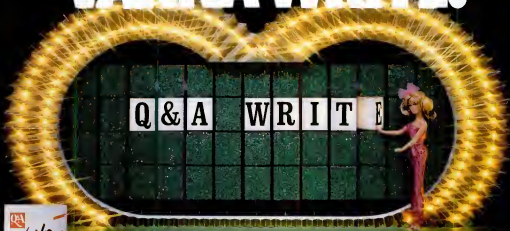
In Short: A rugged and very Hayes-compatible 2,400-bit-per-second modem without any special features.

CIRCLE 481 ON READER SERVICE CARD

provide support for it, or if you have an ongoing relationship with Okidata.

"Best Executive Word Processor," InfoWorld 10/12/88

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CIRCLE 220 ON READER SERVICE CARD

386-to-the-Max Squeezes Out More RAM

PC HANDS ON

BY WINN L. ROSCH

When you stuff your 80386-based PC with 12 megabytes of RAM, you're still apt to run out of memory. The problem is RAM cram—memory-resident programs that hog the 640K that's available for executing DOS applications. Qualitas's \$74.95 program *386-to-the-Max* promises to end that problem—or make it more bearable—while helping you elicit more speed from your 80386 (it won't run on anything less).

To find more memory for DOS applications, *386-to-the-Max* remaps extended memory into whatever holes it can find in the 1MB zone that's accessible in the 80386 chip's real mode. For instance, IBM architecture leaves a notch between video memory and the top of DOS, as

well as other chasms between video, the hard disk routines, and the ROM area. Because *386-to-the-Max* maps working RAM into these empty addressing ranges, you can get more contiguous DOS memory for use by applications, depending on the video adapter.

In a test system—in which DOS and resident programs knocked the RAM available to conventional applications down to 400K—*386-to-the-Max* filled in enough cracks to make 640K available after everything had been loaded. The same memory-swapping ability allows *386-to-the-Max* to move your system's fastest RAM into the DOS area. Exactly where the quickest memory is addressed in any particular computer varies, so *386-to-the-Max* seeks it out, then remaps it.

To further speed the operation of your system, *386-to-the-*

Max moves your system's BIOS routines into fast RAM. In many 80386 computers, BIOS routines are stored in relatively slow 16-bit memory. Moving them to 32-bit RAM can potentially speed performance on input/output operations such as disk reads and video updates.

To make more memory useful, *386-to-the-Max* has an ex-

tended memory manager that converts any amount of the balance of your PC's extended memory to EMS 4.0. Although the default setting turns all remaining extended memory into EMS, you can arrange the split as best suits your system.

Although its name sounds presumptuous, *386-to-the-Max* does deliver on its promises. ☐



FACT FILE

386-to-the-Max

Qualitas Inc.
8314 Thoreau Dr.
Bethesda, MD 20817
(301) 469-8848

List Price: \$74.95

Requires: 640K RAM, hard disk drive, 80386-based computer other than the IBM PS/2

Model 80, DOS 3.0 or later.

In Short: A memory manager that emulates EMS 4.0 memory in the 80386 extended memory area, puts ROM routines in fast RAM, and squeezes extra DOS memory from wasted memory areas. Not copy protected.

CIRCLE 450 ON READER SERVICE CARD

The Ultimate Disk Converter

PC HANDS ON

BY MITT JONES

If you're liquidating assets to pay your disk conversion service, it may be time to look at the Shaffstall 6000—the secret behind the magic of many a disk conversion outfit.

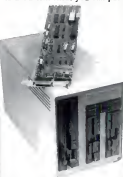
With about every size of disk drive known to man and with software to match, Shaffstall Corp.'s 6000 promises to solve most of your disk and file conversion problems. The 6000 squeezes an 8-inch floppy disk drive, 360K and 1.2MB 5¼-inch floppy disk drives, and a 1.44MB 3½-inch floppy disk drive into one external box.

But don't expect miracles to come cheap. The basic setup alone retails at \$8,500. And depending on your needs, the conversion software will cost you an additional \$500 to \$11,250.

If all you need is the ability to convert files from one type of system—the Wang OIS system,

for example—to your DOS machine, you can get away with spending only \$500. If you want to translate files both to and from that system, the software will cost you another \$500.

If you want the ability to convert from any system format to DOS text files, you can pur-



The Shaffstall 6000 features 8-inch, 5¼-inch, and 3½-inch disk drives and assembly bay for any future formats.

chase the entire Reading Library for \$7,250. You'll need the complete Reading/Writing Library, which lists at a hefty \$11,250, to convert from any system to any system.

The many systems supported include CPM; the IBM Displaywriter; Wang OIS, VS, and WP; the Varityper; Apple's *MacWrite*; most IBM mainframes and minicomputers; and DEC minicomputers.

Running on an 8-MHz AT, the 6000 required about 10 minutes to convert a 145K Displaywriter file into *WordPerfect* format. But the results are impressive. In all formats we tested, the files translated accurately, with centering, underlining, and indents. The varying range of features between word processing systems creates awkward translations at times (tabs might be substituted for indents if the target word processor can't understand an indent). Still, you can doctor a file quicker than you can retype it.



FACT FILE

Shaffstall 6000

Shaffstall Corp.
7901 E. 88th St.
Indianapolis, IN 46256
(317) 842-2077

List Price: \$8,500; individual reading/writing packages, \$500; Reading Library, \$7,250; Reading/Writing Library, \$11,750.

Requires: 640K RAM, 20MB hard disk drive (30MB recommended), 135-watt power supply, DOS 2.1 or later.

In Short: A hardware/software disk and file conversion product that translates to and from an extensive range of formats.

CIRCLE 452 ON READER SERVICE CARD

With a minimum cost of \$9,000 for a usable system, the 6000 isn't meant for the average PC user. But for firms with disk conversion problems, the Shaffstall 6000 is an economically attractive alternative to disk conversion services. ☐

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StarBus Busdriver: A Slot-Independent LAN

PC HANDS ON

BY FRANK J. DERFLER, JR.

The StarBus system for interconnecting computers and resources doesn't fall neatly into any of the categories we've defined in *PC Magazine's* LAN review series. It isn't exactly a data PBX, but it does connect laptops, Macs, Wangs, and other computers without expansion buses just as a data PBX does. It isn't a traditional media-sharing LAN like StarLAN or ARCnet, but it uses two pairs of telephone wires like StarLAN and transmits packets like ARCnet.

I've dubbed StarBus a "slot-independent" LAN to avoid confusion with less-capable software-only zero-slot LANs. StarBus uses hardware to share the network media in a more-or-less conventional fashion, but the hardware doesn't reside inside the PC. Instead, a separate external box connects any device to the network through an RS-232C port.

The main element in a StarBus system is the Busdriver—a box the size of a small modem,

which connects to any RS-232C port, whether in a computer, printer, plotter, or modem.

The Busdriver translates between the RS-232C data stream of the local device and data packets flowing on the simple telephone wires that connect the devices. The electrical topology of the system is a bus on which all stations receive the same signals at practically the same time. The physical topology of this system is very flexible. The wiring plan can use simple telephone cable Y-connectors to link adjacent devices in a small work group, or it can use the wiring-closet topology of larger network installations that use

telephone wire in the walls.

The Busdrivers are easy to install, but you must choose one Busdriver as the poller for the network and always have it turned on when the network is operational, even if its attached computer or printer is off.

Using any RS-232C communications software on the PC, you tell the Busdriver what connection to make. After the connection is established, you can continue to use the communications software, switch to word processing software to drive a printer through the network, or use an application such as *EasyLAN* for background-mode file transfers and printer

sharing between PCs.

At \$350 per Busdriver, StarBus is on a par with most systems using the same kind of wiring, such as StarLAN. It doesn't have the virtual disk capability of StarLAN, but it does provide the ability to link dissimilar computers and to share devices like printers and modems among them.



Macs, Wangs, PCs, printers, and modems can share files and resources through the StarBus Busdriver. An RS-232C connection and communications software are needed.

FACT FILE

StarBus Busdriver

Architectural Communications Inc.
1800 W. Park Dr.
Westboro, MA 01581
(617) 898-2500

List Price: \$350 per StarBus Busdriver.

Requires: RS-232C port on each device, communications software.

In Short: A flexible serial LAN that can link dissimilar computers for file and resource sharing.

CIRCLE 435 ON READER SERVICE CARD

DASnet Links 21 E-Mail Services and FAX

PC HANDS ON

BY NEIL J. RUBENKING

E-mail is a great way of communicating—unless the party you need to reach subscribes to a different e-mail system. After you've been through this frustration a few times, you start to think that the Tower of Babel was merely a prototype. There are a few multilingual e-mail services, but not many.

DASnet, from DA Systems, is like a United Nations for more than 20 services. Say your service is MCI and a colleague subscribes to UUCP. You can get in touch simply by sending a specially formatted MCI message to DASnet. You can also send telexes through DASnet; you

can even get your own telex number. AT&T Mail, Dialcom, EIES, EasyLink, NWI, Peace-Net/ECO Net, Telemail, The Source, Unison, and GeoMail are within DASnet's reach.

DASnet will also convert your e-mail message to Group III fax format so that you are able to communicate directly with anyone who has a fax machine. All you need is the fax

machine's telephone number.

For e-mail links, you need to know the "electronic address" of the recipient—that is, which e-mail service to contact and your correspondent's user ID on that service.

Basic DASnet service costs \$4.50 a month (\$5.50 a month for services based outside the United States). Per-message costs vary, depending on the services you're sending from and to. For example, to send a 4,000-character letter from MCI to Bitnet or UUCP would cost \$1 (in addition to the normal MCI charges).

DASnet will be increasingly useful as more people share electronic addresses, but right now it can put you in touch with associates around the world.



FACT FILE

DASnet

DA Systems Inc.
1503 E. Campbell Ave.
Campbell, CA 95008
(408) 559-7434

MCI ID Number: 304-0160
List Price: \$4.50/month plus per-message charges.

Requires: Membership in one

e-mail service that is linked to DASnet.

In Short: A network that links 21 different e-mail services, allowing you to send e-mail to any member of one of those services or to a FAX machine.

CIRCLE 434 ON READER SERVICE CARD

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FCC Approved Chassis
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Hercules Compatible Graphics Card
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Complete and Ready to Run!

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(0 wait state)
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GOfer: Fast, Full-Service Text Searches Without Any Indexing

PC HANDS ON

BY EDWARD MENDELSON

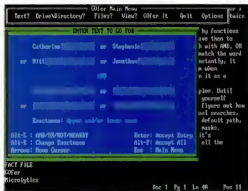
If you searched the animal kingdom for a swift hunter, you probably wouldn't settle on the gopher. But in the software kingdom, one of the swiftest and smartest hunters you'll find is Microlytics' *GOfer*. This \$59.95 utility pops up in the middle of an application, searches for text anywhere on-disk, and lets you copy its quarry into whatever program you're using.

You don't have to index your files first. *GOfer* searches through a full disk, a single file, or anything in between. And it hunts at high speed—typically twice as fast as *The Norton Utilities'* Text Search. But it's significantly slower than search programs that use indexing (like *ZyIndex* or *Memory Lane*). *GOfer* took 15 seconds to find a text string sitting at the end of 1.5MB, a string that *ZyIndex* and *Memory Lane* found in less than 2 seconds.

GOfer consumes a minimum of 91K RAM. Much of this is filled with functions you may not need. You can print the results of a search, save them to disk, or browse through a file. You can narrow or widen a search with AND, OR, and NOT. You can even look for words that almost match the word you're entering but not quite, like *Stephen* and *Steven*.

If you plan to use *GOfer* constantly, it can compress little-used text files and temporarily expand them when searching. If you don't want to clog up your RAM, you can run *GOfer* as a standalone program.

Swift as it is, *GOfer* could probably be sleeker and simpler. Until you feel familiar with the unintuitive keystrokes, you can find yourself cycling re-



GOfer's text entry window accepts Boolean operators and case matching.

FACT FILE

GOfer

Microlytics
300 Main St.
East Rochester, NY 14445
(800) 828-6293
(716) 377-0130
List Price: \$59.95

Requires: 90K RAM above application program requirements; DOS 2.0 or later.

In Short: A fast and unique memory-resident text-retrieval program that doesn't require indexing. Not copy protected.

CIRCLE 432 ON READER SERVICE CARD

peatedly through the overcomplicated menus trying to figure out how to begin a search. While you can specify drives and paths for individual searches—and select or exclude individual files—you can't specify a default path and you can't limit the search to "memo.*" or similar filename masks.

Watch out for *GOfer's* manual. Like the name of the program, it's relentlessly cute. But like the program itself, it eventually gives you all the information you need.

Memory Lane Keeps an Index for Quick File Searches

PC HANDS ON

BY EDWARD MENDELSON

Quick—what did What's-his-name from Omaha tell you when he called last week, and what's the name of the file where you wrote it down? If you don't remember, and you can't remember What's-his-name's name or the name of the directory with your notes, jog down *Memory Lane* for a quick jog of your memory.

With Group L Corp.'s \$99 memory-resident search-and-retrieve utility, you can search for text from inside an application and import any text that you find. The imported block can start and end at any arbitrary points, although it will not re-

tain any formatting codes.

Memory Lane uses an index, but it's more compact than most, and you don't have to do the work of maintaining it. The first time you compile the index, you customize a list of directories and file specs to be included or excluded. Afterward, the program monitors disk activity and remembers the files that you have created or updated. You can tell it to index new or modified files at any time, or you can set it to update the index automatically whenever you return from an application to DOS.

Group L claims an indexing speed of about 300K per minute on an AT. This figure is based on large indexes; when indexing 1MB of text, I measured about

half that speed. Once the index is finished, searches take up to about 5 seconds.

The program reserves about 600K of disk space for itself when indexing up to 4.2MB of files. The reserved space grows to 4.9MB when indexing its

limit of 8,000 files in 33MB.

If you don't mind giving up disk space to an index or using a TSR that looks over your shoulder at all disk activity, *Memory Lane* is the quickest way to retrieve misplaced or forgotten data.



FACT FILE

Memory Lane, Version 1.2

Group L Corp.
481 Carlisle Dr.
Herndon, VA 22070
(703) 471-0030
List Price: \$99

Requires: 100K RAM above

application program requirements; DOS 2.0 or later.

In Short: Memory-resident file searches using automatically updated indexes. Fast and efficient. Not copy protected.

CIRCLE 433 ON READER SERVICE CARD

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At WordPerfect, our commitment to customer service speaks for itself. We put toll-free numbers on every WordPerfect software package. Numbers we encourage our customers to use if they have any questions, suggestions or comments about our products.

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So when you get the urge to discuss a WordPerfect product, give us a call. And the next time you get a hefty phone bill, think of us. We sympathize.



WordPerfect
CORPORATION
CIRCLE 513 ON READER SERVICE CARD

SUMMARY OF CURRENT CHARGES PAGE 1

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NEW ON THE MARKET

80386 Control Program Provides Access To Both Multitasking and Virtual Memory

Intelligent Graphics Corp. says its \$245 VM/386 control program was inspired by IBM's VM/370 mainframe operating system. VM/386 gives 80386 PC users access to the multitasking and virtual memory features of Intel's state-of-the-art CPU chip.

The program creates "virtual machines," which run concurrently and appear to be independently functioning 8086 PCs. Each virtual machine can have its own DOS, CONFIG.SYS, and AUTOEXEC.BAT files and its own memory-

resident programs. The familiar Ctrl-Alt-Del keystroke can be used to reboot the current virtual machine within VM/386 without resetting the host system.

IGC maintains that the virtual machines behave as if each of them had access to all of the resources of the host 386 machine.

According to IGC, a VM/386 user could run Lotus 1-2-3 under DOS 3.0 on one virtual machine and dBASE III under DOS 3.1 on another. The same applies to any combination of other software, and the

number of concurrent virtual machines is limited only by system memory. VM/386 is compatible with applications that support the LIM 3.2 expanded memory specification. Other multitasking environments such as *Microsoft Windows* and *TopView* will run on a VM/386 virtual machine, IGC says.

VM/386 will run with MDA, CGA, EGA, and Hercules graphics standards. List Price: VM/386, \$245.

Requires: 2MB RAM, 80386-based PC. Not copy protected. Intelligent Graphics Corp., 4800 Great America Pkwy., Santa Clara, CA 95054; (408) 986-8373.

CIRCLE 438 ON READER SERVICE CARD

GammaLink Unveils an Internal Fax Board For The Micro Channel Bus

The \$995 GammaFax MC brings background facsimile capability to the Micro Channel bus. The add-in card lets PS/2 users communicate with any group 3 fax device, GammaLink says.

The GammaFax MC can also exchange DOS files at 9,600 bits per second with any PC that has a GammaFax MC or a GammaFax board.

List Price: GammaFax MC, \$995. Requires: PS/2 Model 50, 60, or 80. GammaLink, 2452 Embarcadero Way, Palo Alto, CA 94303; (415) 856-7421.

CIRCLE 447 ON READER SERVICE CARD

ATI Technologies' New Adapter Runs VGA and Old Graphics Standards

ATI Technologies, maker of the best-selling EGA Wonder, has thrown its hat into the VGA ring. The VIP adapter works with old-bus systems and supports the EGA, CGA, and Hercules graphics standards in addition to the new IBM VGA standard.

ATI says that VIP displays all 17 VGA modes on analog monitors and displays the older IBM graphics standards on digital monitors. The adapter automatically senses and switches to accommodate analog monitors and selected software.

VIP offers resolution of up to 800 by 560 pixels on multi-synchronous monitors. It displays a maximum of 256 colors from a palette of 256,000.

Included with the VIP card are both 9-pin and 15-pin connectors to allow use with either digital or analog monitors.

List Price: VIP, \$449. Requires: IBM PC or compatible bus. ATI Technologies Inc., 3761 Victoria Park Ave., Scarborough, Ontario, Canada M1W 3S2; (416) 756-0711.

CIRCLE 442 ON READER SERVICE CARD

Replacement Motherboards Deliver 80386 Capabilities to Older XT and AT Machines

You can make your XT- or AT-class PC into a wolf in sheep's clothing by dropping in one of the replacement 80386 motherboards that have recently appeared.

The \$1,650 SX386, from Dyna Computer, is a 16-MHz motherboard that will transform your IBM PC-XT into a full-fledged 80386 machine. The board comes with 2MB of on-board 32-bit memory and can hold up to 8MB of RAM. There are four 16-bit I/O slots and four 8-bit slots. The memory bus runs at 16 MHz.

The \$1,795 Micronics motherboard, from Micronics Computers, runs at 16 or 20 MHz and comes with 1MB of static

column RAM. The RAM is located on an add-in card that plugs into a dedicated 32-bit slot. This memory slot can hold up to 10MB. You have the choice of an Award or Phoenix BIOS. An expansion bus has five AT- and two XT-compatible slots.

One of Mylex Corp.'s entries in the 80386 motherboard market, the Mylex 386, runs at 16 MHz and features an on-board 64K cache of 32-bit memory. The board (approximately \$1,450) comes standard with 1MB of 32-bit RAM and has six 16-bit expansion slots and two 8-bit slots. There is also a socket for Intel's 80287 coprocessor,

and the 80387 chip is available on a piggyback board. The BIOS is by AMI.

The Mylex 386 is designed for PC ATs and compatibles with AT footprints. The company also produces a line of 80386 motherboards for use with XT-class machines, and it offers a 20-MHz AT board as well. List Price: SX386, \$1,650.

Requires: IBM PC-XT or compatibles with XT footprint. Dyna Computer Inc., 3081 N. First St., San Jose, CA 95134; (408) 943-0100.

CIRCLE 439 ON READER SERVICE CARD

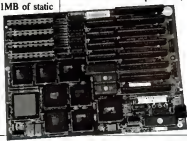
List Price: Micronics motherboard, \$1,795. Requires: IBM PC AT, Compaq 80386 PC, or some compatibles. Micronics Computers, 110 Pioneer Way, Bldg. D., Mountain View, CA 94041; (800) 234-4386.

CIRCLE 440 ON READER SERVICE CARD

List Price: Mylex 386 system motherboard, approximately \$1,450. Requires: IBM PC AT or compatibles with AT footprint. Mylex Corp., 47650 Westinghouse Dr., Fremont, CA 94539; (800) 44-MYLEX.

CIRCLE 441 ON READER SERVICE CARD

Dyna Computer's SX386 replacement motherboard (\$1,650) transforms PC-XTs and compatibles with XT footprints into full-fledged 80386-based machines.



Adapter Cards Connect Local Area Networks to The Micro Channel Bus

Two board manufacturers have joined Pure Data by announcing adapters that will connect your PS/2s to local area networks.

Orchid Technology has announced the \$495 PCnet-2 for use with PS/2 Model 50s and 60s. Like other products that implement Orchid's PCnet LAN, PCnet-2 retransmits through a CATV baseband coaxial cable with up to 7,000 feet between nodes. The PCnet-2 is compatible with other PCnet and PCnet/Conquest cards on the same network.

Meanwhile, **Tiara Computer Systems** has joined Pure Data in the Micro Channel ARCnet adapter market. The \$695 LanCard A-II attaches PS/2 Model 50s, 60s, and 80s to ARCnet networks.

The company has also introduced the \$395 LanCard A-386, which is an ARCnet adapter optimized for today's high-speed, high-performance systems. The card is compatible with old bus

Orchid Technology's \$495 PCnet-2 adapter connects PS/2 Model 50s and 60s to Orchid's PCnet LAN.

micros such as the IBM PC AT and the Compaq Deskpro 386. The half-size card operates at up to 16 MHz with zero wait states. **List Price:** PCnet-2, \$495.

Requires: PS/2 Model 50 or 60. Orchid Technology Inc., 45365 Northport Loop West, Fremont, CA 94538; (415) 683-0300.

CIRCLE 443 ON READER SERVICE CARD

List Price: LanCard A-II, \$695.

Requires: PS/2 Model 50, 60, or 80. Tiara Computer Systems, 2700 Garcia Ave., Mountain View, CA 95014; (408) 446-9158.

CIRCLE 444 ON READER SERVICE CARD

List Price: LanCard A-386, \$395.

Requires: IBM PC or compatible bus. Tiara Computer Systems, 2700 Garcia Ave., Mountain View, CA 95014; (408) 446-9158.

CIRCLE 445 ON READER SERVICE CARD

Ven-Tel Debuts 2,400-Bps Internal Modem for High-End PS/2 Models

The 242 modem from Ven-Tel is designed to work with the IBM PS/2 Models 50, 60, and 80. The 2,400-bps internal board supports the AT command set and works with virtually all communications software on the market, according to Ven-Tel.

The modem features auto-

dial, auto-answer, automatic fallback, and an extra phone jack to facilitate voice/data switching.

List Price: 242 with Crossstalk XVI, \$549; without software, \$449. **Requires:** IBM PS/2 Model 50, 60, or 80. Ven-Tel Inc., 2121 Zanker Rd., San Jose, CA 95131-2177; (408) 436-2177.

CIRCLE 446 ON READER SERVICE CARD

A Memory Manager for TSRs Shuttles Pop-ups Into and Out of Memory

Extra, from Delta Technology, is a \$99.95 memory manager that effectively allows you to load up to 26 TSRs in the RAM space that is required by only one TSR. **Extra** swaps TSRs in and out of RAM, storing them on disk or in expanded or extended memory. Tapping **Extra**'s hotkey brings up a menu, from which you can select the

TSR that you want.

Since **Extra** maintains one TSR in memory at all times, you have the option of popping up the current TSR by hitting its normal hot key. Delta says that the delay caused by **Extra**'s intervention is negligible.

List Price: **Extra**, \$99.95.

Requires: 256K RAM, one disk drive, DOS 2.0 or later. Not copy protected. Delta Technology, 1621 Westgate Rd., Eau Claire, WI 54703; (715) 832-7575.

CIRCLE 443 ON READER SERVICE CARD

HOT PROSPECT

Lotus Agenda, a Data Manager, Breaks Traditional Database Limits

When Mitch Kapor gave up control of Lotus Development Corp. in 1986, speculation ran high. It was considered unlikely that Lotus's founder would completely abandon software development for the linguistic and philosophy courses he was enrolled in at MIT.

He didn't. In November, Lotus unveiled the project Kapor has been spearheading for more than 2 years: **Lotus Agenda**. A text manager, **Agenda** groups snippets of information (called items) into categories defined by the user. **Agenda** will assign new items into categories automatically and will keep an item in several categories at once, if appro-

priate. A "view" of the database lets you cut through categories to make queries.

Views are presented almost instantaneously, and the use of synonyms and filters in defining views is very flexible.

Lotus plans to ship DOS and OS/2 versions of **Agenda** simultaneously in early spring of 1988.

List Price: **Lotus Agenda**, \$395.

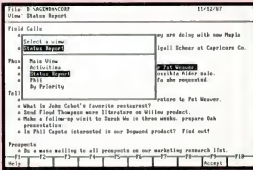
Requires: 512K RAM, hard disk drive, DOS 2.0 or later or OS/2.

Not copy protected. Lotus Development Corp., 55 Cambridge Pkwy., Cambridge, MA 02142; (617) 577-8500.

CIRCLE 437 ON READER SERVICE CARD



Ven-Tel's 242 internal modem (\$549 with Crossstalk XVI is, with Everex's \$399 Evercom II 24, among the first internal modems compatible with the Micro Channel.



Lotus Agenda can make connections between large batches of seemingly unrelated data. Views enable you to organize the items by an assortment of criteria.

PC UPDATE

edited by Peggy Gavan

**Verticom
H-16, H-16B,
H-256,
AutoCAD**

Verticom has added a software driver option to its H-series line of high-resolution color graphics controllers, which lets *AutoCAD* users display two interactive windows simultaneously. The driver, called the *TwinFocus*, also boosts *AutoCAD*'s zoom and pan speeds by up to five



AutoCAD users can now display two interactive windows at one time using Verticom's TwinFocus software driver.

times and allows users to switch instantly from two zoomed views to a view of the full drawing. The *TwinFocus*, priced at \$195, is available for the H-16, H-16B, and H-256 controllers. Verticom Inc., Sunnyvale, Calif.; (408) 747-1222, (800) 433-5760.

**Intel
Inboard 386**

Intel Corp. has enhanced the *Inboard 386* and reduced its price by up to 25 percent. The new features include software utilities for disk caching and screen speedup, plus LIM EMS 4.0 support. The *Inboard 386* with no memory is now priced at \$1,599, a reduction of \$400. The 1MB version is priced at \$1,895, down from \$2,495. Free software upgrades are available to all current owners. Intel Corp., Hillsboro, Oreg.; (503) 629-7354.

Graph-in-the-Box, Version 2

New England Software's *Graph-in-the-Box*, Version 2, has a number of new features, including VGA and MCGA graphics support, on-screen slide show capabilities, full-page printouts, and a file merge operation that combines data from multiple files into one chart. In addition, the new version is fully compatible with *PageMaker* and *Ventura Publisher*. *Graph-in-the-Box* is priced at \$99.95. Up-

grades are available to registered users for \$10 if the program was purchased after September 15, 1987, and \$25 if it was purchased before that date. New England Software, Greenwich, Conn.; (203) 625-0062.

What'sBest!

What'sBest!, Version 1.2, requires 27K less RAM than the earlier versions and completely supports *SuperCalc4*, *VP-Planner*, and Lotus's *HAL*. In addition, General Optimization has removed copy protection from the Commercial and Professional versions and has added support for 60 percent more optimizable and constraint cells to the Personal version. There is no update charge for registered users who have purchased *What'sBest!* since January 1, 1987. Upgrades are \$25 for all other registered users. General Optimization Inc., Chicago, Ill.; (312) 248-7300.

IN BRIEF

Datavue Corp.'s *Snap 1+1* laptop computer now has a dual-speed microprocessor, with switchable speeds of 9.54 and 4.77 MHz. The new model, called the *10MHz Snap*, has a base price of \$2,295, \$200 more than the 4.77-MHz model. Datavue, Norcross, Ga.; (404) 564-5555. . . Entek's *EntekCAD* two-dimensional CADD program is now priced at \$195, a reduction of \$300. Entek Scientific Corp., Cincinnati, Ohio; (513) 563-7500.

PS/2 WATCH

**Key Tronic
Keyboards**

Key Tronic Corp. is offering upgrade kits for its KB 101-1, KB 3270/PC, KB 5152B, and KB 5153 Touch Pad keyboards that make them compatible with IBM's PS/2 line of computers. The upgrade kits include a PROM, a cable adapter, and utility software, each priced at



Key Tronic's entire line of keyboards, including the KB101-1 (above), is now compatible with IBM's PS/2s.

\$7.95. In addition, Key Tronic has reduced the prices of its keyboards by up to \$150. New prices range from \$139 for the KB 101-1 to \$599 for the KB 5152B with bar-code wand. Key Tronic Corp., Spokane, Wash.; (509) 928-8000.

Turbocharge Your Programming With Turbo Basic!



Turbo Basic® is the BASIC compiler you've been waiting for! It's a complete development environment with an amazingly fast compiler, a full-screen windowed editor, pull-down menus, and a trace debugging system. We've also added many innovative features including binary disk files, true recursion, and several new compiler directives to give you more control at compile time. And your program size isn't limited by 64K—you can use all available memory!

"I'm extremely impressed with Turbo Basic. It's fast, it cooperates with resident keyboard handlers... it offers a wealth of important new features, and it costs only \$99."

Edwin Winer, PC Magazine

Giovanni Perrone quote, reprinted from PC Week, May 5th, 1987.
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- A technical look at Turbo Basic**
- Context-sensitive help
 - Full recursion supported
 - Customizability of user interface and editor
 - Full 64K for strings
 - Standard IEEE floating-point format
 - Floating-point support, with full 8087 (math coprocessor) integration. Software emulation if no 8087 present
 - Program size limited only by available memory (no 64K limitation)
 - EGA and CGA support
 - IBM Personal System/2 VGA and MCGA 2- and 16-color support in 640 x 480 resolution

"Borland International's Turbo Basic is unquestionably an outstanding software product. It provides an efficient and comprehensive BASIC programming environment at a very affordable price."

Giovanni Perrone, PC Week

Turbo Basic sets a standard for programming languages on PCs that is the equivalent of the first running of the four-minute mile.

Corporate users of BASIC will find Turbo Basic a tool worth many times its cost and a quantum improvement over anything they have ever used.

"William Zachmann, Computerworld"

BASIC Benchmarks

	Turbo Basic 1.0	QuickBasic 3.07
Compile & Link to Stand alone .Exe	3	17
Size of .Exe	32753	41162
Execution Time w/80287	18 secs	25 secs
w/o 80287	109 secs	114 secs

Benchmark by Jerry Pezomile run on IBM PC/AT with 80287 at 8 MHz with IEEE floating point. Benchmark file is two floating-point matrices with 50 elements, multiplies the two matrices and sums the results.
Sum = 23345440.135513



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CIRCLE 137 ON READER SERVICE CARD

QUICK LOOKS

At Last, Search and Replace for 1-2-3

PC HANDS ON

BY EDWARD MENDELSON

Near the top of everyone's list of functions that ought to be in 1-2-3, you'll find search and replace. You'll find it there because in 1-2-3, it's tough to find anything. If you're looking for a label in a large spreadsheet, you have to page through every screen by hand. And if you're looking for something in a formula, you have to drag the formula to every cell in which a formula might be concealed.

SMI Corp.'s \$34.95 add-in, *Search-Replace for Lotus 1-2-3*, lets you find anything anywhere in a spreadsheet. You

Sub: (A2) (B1) (C1) (D1) (E1) (F1) (G1) (H1) (I1) (J1) (K1) (L1) (M1) (N1) (O1) (P1) (Q1) (R1) (S1) (T1) (U1) (V1) (W1) (X1) (Y1) (Z1)

Replace the search string with the replace string

REF	12303	Instruct	Hit	Case	Read
Compex 386 (16Mn)	4.23	18.68	1.52		
Compex 386 (18Mn)	4.18	9.85	1.78		
Compex 386 (16Mn)	2.89	4.23	0.72		
PC limited 120Mn	2.88	5.88	0.80		
PC limited 120Mn	2.89	4.34	0.61		
Architect 11 Model 380	2.88	5.88	0.82		
GI 1 25/25-12	2.69	5.72	0.82		
Core Atomizer (16Mn)	5.48	9.67	1.21		
Core Atomizer (16Mn)	4.18	7.83	0.93		
Tandem 47	4.22	9.53	1.26		
Lavery 47	4.17	7.85	0.74		
W2 ARC 3U	4.17	8.98	1.21		
IBM PC AT w/total 386 (4Mn)	3.63	18.73	2.88		
	3.68	7.64	1.59		
IBM AT (16Mn)	5.58	12.25	1.81		
IBM AT (8Mn)	4.17	8.54	1.32		
IBM XT/286 (16Mn)	5.55	9.61	1.27		
12 Nov 87 01:47 PM					

SMI Corp.'s *Search-Replace for Lotus 1-2-3* (\$34.95) features just about all of the search-and-replace options that a spreadsheet user would want, including case-sensitivity. Also, you can simply enter a search string

fold it into 1-2-3 via Lotus's add-in manager, which comes on the disk. A menu lets you specify the range, direction, and case-sensitivity of a search, or you can enter a string and go. You can replace cell references in formulas or any other text. The program won't set speed records, but it works.

If you use Turner Hall's *Note-It Plus or SpellIt*, you already have a handy search function for 1-2-3. But if you don't, SMI's *Search-Replace* may be all you need.

List Price: *Search-Replace for Lotus 1-2-3*, \$34.95. **Requires:** *Lotus 1-2-3*, Release 2.0 or later. Not copy protected. SMI Corp., P.O. Box 582221, Tulsa, OK 74158; (918) 560-9536.

CIRCLE 458 ON READER SERVICE CARD

Sideways Now an Add-in, Runs Macros

PC HANDS ON

BY CATHERINE D. MILLER

For several years, *Sideways*, from Funk Software, has been a favorite pop-up utility among spreadsheet users. It rotates a spreadsheet 90 degrees and prints it on a dot matrix printer.

Sideways, Version 3.21, adds another way to use the program—as a 1-2-3 add-in. You can now pop up *Sideways* and print a worksheet without leaving 1-2-3. And you can still use *Sideways* in the three modes offered in the previous version—as a pop-up utility to print text or 1-2-3 files or as a Symphony add-in.

Sideways now supports nearly 40 graphics printers, including the HP LaserJet. Funk Software's excellent technical support people will help you install *Sideways* to work with your printer, if it is not supported.

The latest version also respects 1-2-3 zero suppression and page breaks. *Sideways* now keeps track of special effects when you change spreadsheet

ranges and lets you use macros within *Sideways*. And if you want to print an entire spreadsheet, you don't have to specify a range—you simply select the Go command.

With *Sideways*, Version 3.21, a wonderful utility gets even better.

List Price: *Sideways*, Version 3.21, \$66.95; upgrade from any previous version, \$20. **Requires:**

128K RAM to print text files or as a 1-2-3 standalone, 75K RAM as Symphony add-in, 70K RAM as 1-2-3 add-in; graphics printer; DOS 2.0 or later. Funk Software Inc., 222 Third St., Cambridge, MA 02142; (617) 497-6339.

CIRCLE 456 ON READER SERVICE CARD

A No-Stick Floppy Lets You Be Sloppy

PC HANDS ON

BY JONATHAN MATZKIN

When I was asked to examine the DataLifePlus floppy disk, I thought immediately of that television commercial with the very large gorilla and the suitcase. You know, "our floppy disk is so tough. . ."

Verbatim's new 5 1/4-inch floppy disk has a Teflon coating (that's right, as in eggs won't stick) that's supposed to protect your valuable data from all kinds of office accidents (as from drips, spills, and various lunch items).

Well, the floppy disk didn't lose any data when I put my grubby fingers all over the ex-

posed media. But neither did an ordinary 3M disk that I similarly mishandled.

Liquid Paper smears wiped completely off the coated media of the DataLifePlus disk (now remember, boys and girls, I am a trained professional—you should not try this experiment at home) while a standard floppy disk was left with a cakey, white residue that I didn't want to risk having in either of my two floppy disk drives.

The question is whether a Teflon-coated floppy disk is genuinely more resistant to data loss or is merely a way to extract some more money from the consumer. Verbatim claims that its tests show a marked improvement in resistance to damage

caused by fingerprints, coffee spills, Liquid Paper stains, and other office disasters—but I found no instances of disk damage in which Teflon-coating made a difference, aside from Liquid Paper smears.

There is the possibility—at least in theory—of reduced head wear because Teflon is a lubricant. But you only have to lose one floppy disk full of valuable data to appreciate the value of a safer disk, and Verbatim's extra charge will not seem unreasonable.

List Price: *DataLifePlus*, \$23.80 per 10-pack. Verbatim Corp., 1200 W.T. Harris Blvd., Charlotte, NC 28213; (704) 547-6500.

CIRCLE 457 ON READER SERVICE CARD

Paradox: the top-rated relational database manager in the world

Source: Software Digest*

Software Digest Rating	Overall Evaluation	Program Name	Version Tested	Ease of Learning	Ease of Use	Error Handling	Performance	Versatility	Memory Requirement	Price
☆☆☆☆	8.7	Paradox	1.1	■	■	■	■	■	512K	\$495
☆☆☆☆	8.2	XDB	1.10	■	■	■	■	■	320K	\$750
☆☆☆	7.6	PowerBase	2.3	■	■	■	■	■	384K	\$349
☆☆☆	7.0	Open Access II	2.0	■	■	■	■	■	256K	\$395
☆☆☆	7.0	DataEase	2.5/2	■	■	■	■	■	384K	\$600
☆☆	6.6	dBASE III PLUS	1.1	■	■	■	■	■	384K	\$695
☆☆	6.4	RdBASE System V	1.1	■	■	■	■	■	512K	\$700

RATINGS KEY
(On a scale of 0 to 10)
Overall Evaluation

☆☆☆☆ 9.0 or higher
★★★★ 8.0 - 8.9
★★★ 7.0 - 7.9
★★ 6.0 - 6.9
★ 5.0 - 5.9

All Other Ratings

■ 7.0 - 9.9
■ 5.0 - 6.9
■ UNDER 5.0

Paradox® is once again the top-rated program, with the latest version scoring even higher than last year's top score." (Software Digest's 1987 Ratings Report is an independent comparative ratings report for selecting IBM PC business software. Ratings Report tests were done by the prestigious National Software Testing Laboratory, Philadelphia, Pennsylvania.)

The Ratings Report message is crystal clear: there is no better relational database manager than Paradox. NSTL tested 12 different programs and amongst other results, discovered that Paradox is 3 times faster than dBASE* and 6 times faster than R:BASE* on a two-file join with subtotals test.†

Paradox combines ease of use with power and sophistication

Even if you're a beginner, Paradox is the only relational database manager that you can take out of the box and begin using right away. Because Paradox employs state-of-the-art artificial intelligence technology, it does almost everything for you—except take itself out of the box.

“Paradox 2.0 will do for the LAN what the spreadsheet did for the PC.”

David Schulman
Bendix Aerospace



Special Offer!

We're making a Special Offer on all three versions of Paradox. Mail proof of purchase, dated between Sept. 15, 1987 and Dec. 15, 1987 and your signed registration form for any of the three, and we'll mail you a \$100.00 rebate.** It's that simple!

- Paradox 1.1, suggested retail, \$495.00
- Paradox 2.0, suggested retail, \$725.00 (each copy of Paradox 2.0 supports one user on a network)
- Paradox Network Pack, suggested retail, \$995.00 (each network pack supports up to 6 users on a network)

60-Day Money-Back Guarantee††

PARADOX
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System Requirements for Single User:

- DOS 2.0 or higher
- IBM® PS/2 and PC, Compaq® PC families and other 100% compatibles
- 312K RAM
- Two disk drives, 3½-inch and 5¼-inch supported
- Compatible monochrome, color, or VGA monitor with adaptive

^aReprinted with permission by Elsevier (digitized from 25 July 1987). Reprint courtesy of Elsevier Science Publishing.

This was designed and executed by M77, a 1,000-record and a 10,000-record file were printed. It started and held from the 1,000-record file and a summary, held from the 10,000-record file were collected using the 1,000-record file as the address. The start had been grouped and sorted in ascending order. The summary had been sorted by each group, and the results added to a last group. All items from the last group were in the command sequence until more of program control were recorded and executed.

*Please request must be received in Berlin no later than February 15, 1988. Mail to: Parasitology Department, Berghof International, 4100 South Wiley Street, South Jordan, UT 84092.

111 within 90 days of purchase, the product does not perform as guaranteed with our claims, call our customer service department, and we will arrange a refund.

CIRCLE 377 ON READER SERVICE CARD

How to tell the difference between DESQview™ 2.0 and any other environment.

Selecting DESQview, the environment of choice, can give you the productivity and power you crave, without the loss of your old programs and hardware. If you like your existing programs, want to use them together, transfer data between them, print, sort, communicate with or process-in-background, yet still have the need to keep in place your favorite PC(8088, 8086, 80286 or 80386), DESQview is the "proven true" multitasking, multi-windowing environment for you. Best of all, DESQview 2.0 is here now, with all the money saving, time saving, and productivity features that others can only promise for the all-too-distant future.

And with DESQview's new graphics enhancements for Hercules, CGA, EGA, and VGA, Version 2.0 still offers the same award winning and pioneering features for programs that earned DESQview its leadership, only now you can also run desktop publishing programs, CAD programs, even GEM™, Topview™ and Microsoft Windows™ specific programs. In some cases you'll add as little as 10–40K to your system overhead. Now you can have multi-tasking, multi-windowing, break the 640K habit too and still get an auto dialer, macros, menus for DOS and, for advanced users, a new complete application programmer's interface capability. No wonder that over the years, and especially in recent months, DESQview, and now DESQview 2.0 have earned extravagant praise from some of the most respected magazines in the industry.

"Product of the Year" by readers vote in InfoWorld.
 "Best PC Environment" by popular vote at Comdex Fall in PC Tech Journal's "System Builder" Contest.
 "I wouldn't want to run an IBM



One picture is worth a thousand promises.

Attention Programmers: For more information about Quarterdeck's API, and future 386 program extensions, call us today.

SYSTEM REQUIREMENTS

IBM Personal Computer and 100% compatibles (with 8086, 8088, 80286 or 80386 processors) with monochrome or color display. IBM Personal System/2: Memory: 640K recommended; for DESQview itself 0-16K; Expanded Memory (Optional): expanded memory boards compatible with the Intel AboveBoard; enhanced expanded memory boards compatible with the AST RAMPage; Disk: Two diskette drives or one diskette drive and a hard disk - Graphics Card (Optional): Hercules, IBM ColorGraphics (CGA), IBM Enhanced Graphics (EGA), IBM Personal System/2 Advanced Graphics (VGA) - Mouse (Optional): Mouse Systems, Microsoft and compatibles - Modem for Auto-Dialer (Optional): Hayes or Compatible - Operating System: PC-DOS 2.0-3.3, MS-DOS 2.0-3.2 - Software: Most PC-DOS and MS-DOS application programs; programs specific to TopView 1.1, GEM 1.1 and Microsoft Windows 1.01 - Media: DESQview 2.0 is available on either 5 1/4" or 3 1/2" floppy diskettes

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Mail to: Quarterdeck Office Systems, 150 Pico Boulevard, Santa Monica, CA 90405.				
NOTE: If you own DESQview call us for a special upgrade offer, or send in your DESQview registration card. AST Special Edition users included.				
				PCM 1/12



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DEALERS CIRCLE 525 ON READER SERVICE CARD
 END USERS CIRCLE 534 ON READER SERVICE CARD

COMMUNIQUÉS

edited by Bill Howard

**DOS to Travel:
Heavyweight Class**

"Tandy's Model 1400LT lap-top computer features a "backlit" super-hoist LCD display and a NEC V20 processor."

—PC Resource, November 1987

**Render to the Lord
That Which Is Due**

"PowerChurch Plus! Fast, friendly, reliable church administration system . . . Unlimited capacity. Free demo \$10."

—PC World, October 1987

Talk of the Times

"Mr. Bernstein said he planned to buy more shares in . . . Lotus Development, the software company, and Mead Corporation, the big paper manufacturer."

—The New York Times, October 23, 1987

Amazing Facts I

"Though the Apple Macintosh was compatible with the PC world until recently . . ."

—The Washington Post, October 18, 1987

Amazing Facts II

"[The Model 50] comes with IBM memory, VGA standard graphics. It comes with 1 Meg of mouse ports."

—Nabih's Inc., ad, Jewish United Federation News (Evanston, Ill.), October 1987

Amazing Facts III

"Use [the Kyocera KM1200S modem] with IBM 2 or Hayes Systems or compatible computer/terminal . . . 1170 to 1212 bps data rate."

—COMB liquidators catalogue

**Quattro: The Natural
Evolution**

Monkeys see, monkeys do. Ad for Novell (top) and recent Borland Quattro ad.

**Grammatik II
Checked This?**

"[Grammatik II] checks for split infinitives, passive voice, awkward language, wordiness, cliché's, incorrect punctuation, and suggests improvements."

—MicroPro's WordStar News, September/October 1987

Vapor Ware

"Olivetti is also reported supplying its own multitasking operating system, called 386 Topjob . . . the company is cited calling its product a stop-gas measure until OS/2 comes along."

—Aslib Information (Journal for the Association for Information Management), September 1987

Amazing Facts IV

"[Microsoft Word is] one of the three most highly respected word processing programs for law offices. One would expect as much from the largest and oldest personal computer software company in the world, the firm that gave us MS-DOS, UNIX and Multiplan . . ."

—The Lawyer's PC Newsletter, October 1, 1987

Amazing Facts V

"In fact, Macs have made such a splash in the personal computer marketplace that IBM has been forced to bring out the PS/2, a machine that looks and acts very much like a Macintosh—and doesn't even run DOS!"

—Digital Review, September 28, 1987



"So what if I fooled English? I can always get a job writing computer manuals."

Heard or seen anything offbeat, unusual, or just plain dumb about the computer industry? Send your offerings to COMMUNIQUE, PC Magazine, One Park Avenue, New York, NY 10016, or MCI Mail 157-9301. Please print your name legibly; include the name, city, and publication date of any newspaper clipping; and include your T-shirt size. Contributors receive \$30 and a PC Magazine T-shirt. In case of duplicate entries, the earliest postmark prevails. Sorry, but entries can't be acknowledged.

Winners this issue: Mark Grov (Lotus software), Charles Edwards (Apple compatibility), David Bell (1 meg mouse ports), Carlos Emmons (Macintosh UNIX), Woody Leontovich (Kawera modem), Allen Godsh (super hoist display), Maria Garles (PS-2 that doesn't run DOS), Alan Wachel (cliche's), John Goddard (stop-gas Topjob), Paul Peterson (advertising evolution).

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- **EEMS RAM CARD FOR AT**
16-bit 2 MB extended or expanded memory per card and up to 4 cards per PC/AT. Software supported: DESQVIEW, Framework, Symphony and Lotus 1-2-3, plus others. Supports speeds of 10 MHz on PC AT. Board comes with O.K.

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32-bit 2 MB extended memory card for the 386 AT system board.

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- **PC OPTICAL MOUSE**
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- Microprocessor-based intelligent terminal controller. Z-80B CPU
- 16 KB dual port RAM, 8 KB local RAM
- 6 asynchronous serial channels
- Compatible with any Xenix-supported terminal/device
- Includes drivers for (Santa Cruz) SCO Xenix V2.2 and Microsoft Xenix V2.

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80286 ACCELERATOR CARD

Accelerates your PC/XT to faster speeds than AT. 80286/8088 mode switchable. Clock speed: 10 MHz. 8 KB of high speed 0 wait state cache memory. Support for 80287 running at 6 or 10 MHz.

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\$185**

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Micropolis 44 MB Full Ht 28 ms	CALL
Miniscribe 40 MB Full Ht 28 ms	CALL

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4160 CGA Hi Res 14" Color	\$359**
4460 EGA 640 x 350	\$395**
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IBM 3278/79 TERMINAL EMULATOR CARD

Fully emulating IBM 3278 monochrome or IBM 3279 color terminal with up to 3564 character display and 80 character status indicator line. IRMA compatible. File transfer operated under TSO or CMS.

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STANFORD 286-12

6/12 MHz Zero Wait State
14 MHz Throughput

Same configuration as in System 286-16 except,

- 80286-10 CPU, 6/12 MHz Switchable

System Price **\$1179⁰⁰**

STANFORD 286-10/1

6/10 MHz Zero Wait State
12 MHz Throughput

Same configuration as in System 286-16 except,

- 6/10 MHz clock w/o wait state
- 640K 100 Nano Seconds, 0 wait state DRAM installed, expandable to 1024KB

System Price **\$1049⁰⁰**

STANFORD 286-10/2

6/10 MHz

Same configuration as in System 286-16 except,

- Regular size AT main board & chassis
- 640K (120 N/S) DRAM on board
- Phoenix BIOS

System Price **\$949⁰⁰**

STANFORD 4.77/10

- 4.77/10 MHz, software switchable M/B
- Phoenix BIOS, Norton SI:3.3
- Socket for 8087 math co-processor
- 640K 120 N/S DRAM on board
- Floppy drive controller
- 360K floppy drive
- AT/XT style keyboard
- AT Jr. case, XT size with AT features
- Hardware Reset and Turbo L.E.D.
- Keyboard lock, Power LED
- 150 watt power supply
- 8 expansion slots
- High quality, heavy duty packaging

System Price **\$529⁰⁰**

STANFORD 286-16

10/12 MHz Zero Wait State
16 MHz Throughput

- Compact size AT main board
- Intel 80286-12 CPU, 10/16 MHz: software (keyboard) switchable clock
- Award BIOS, Norton SI:15.8
- 1024KB (one megabyte) 90 Nano Seconds, 0 wait state DRAM, installed
- High capacity floppy controller card
- 1.2 MB floppy drive
- Serial port (Com 1), optional 2nd serial port (Com 2), parallel port, and game port
- 8 expansion slots (6-16 hits, 2-8 hits)
- Built in setup program
- Clock/calendar with rechargeable battery backup
- Hardware Reset and Turbo L.E.D.
- Selectable between zero wait state (10/16 MHz) or one wait state (8/12 MHz)
- Socket for 80287 math co-processor
- 180 watt power supply
- Enhanced keyboard (101 keys)
- Complete documentation
- High quality, heavy duty packaging

System Price **\$1444⁰⁰**

NETWORKING

STANFORD INTELLIGENT NET-II CARD

Ether Net/Charger Net specification, 80186 processor & 82586 LAN coprocessor on board. Protocol: CSMA/CD, IBM NET BIOS compatible. Data transfer rate: 10 MB/S. Network software compatibility: PC-NET, MS-NET, Novell's Advanced Network.

\$499⁰⁰

STANFORD 4.77/8

Same configuration as 4.77/10 MHz XT, except,

- XT slide case
- 640K 150 N/S DRAM, Norton SI:1.7
- Standard or Phoenix BIOS

System Price **\$474⁰⁰**

STANFORD 386-18

9/18 MHz Zero Wait State
21 MHz Throughput

- Intel 32 Bit 80386 CPU (18 MHz), 9/18 MHz: software (keyboard) switchable clock
- Norton SI: 21 (Processor Speed)
- 200 watt P/S, 110/220V selectable
- CMOS memory, 16 channel Interrupt, 7 DMA channels
- 512K interleaved 32 bit RAM on board
- RAM can be expanded to 16 MB of 32 bit high speed interleaved memory
- 2-32 bit, 4-16 bit & 2-8 bit expansion slots
- Supports 80387 math co-processor
- Phoenix or Award BIOS
- High capacity floppy controller card
- 1.2 MB floppy drive
- Serial port (Com 1), optional 2nd serial port (Com 2), parallel port, & game port
- Hardware Reset and Turbo L.E.D.
- Clock/calendar with battery backup
- Enhanced keyboard (101 keys)
- Complete documentation included
- High quality, heavy duty packaging

System Price **\$2058⁰⁰**

STANFORD 386-16/1

6/16 MHz Zero Wait State
19 MHz Throughput

Same configuration as in System 386-18 except,

- Intel 32 Bit 80386 CPU (16 MHz), 6/16 MHz: software (keyboard) switchable clock
- Norton SI: 18.7 (Processor Speed)

System Price **\$1979⁰⁰**

STANFORD 386-16/2

Same configuration as in System 386-16/1 except includes socket for 80287 math co-processor.

System Price **\$1884⁰⁰**

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N.e.w.S

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PC Paintbrush, PC Paintbrush+, and Publisher's Paintbrush are all available in either 1.5" or standard 5.25" diskette. Use as a call if you need to upgrade your current version to match the new information.

ZSoft Corporation can be reached by phone at (404) 426-0008, or by mail at 450 Franklin Rd., Suite 106, Marietta, Georgia 30067.

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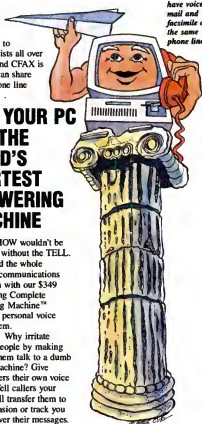
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■ BILL MACHRONE

BEATING UP BILL

This industry is blessed with some of the most talented leaders in American business. Why, then, do we force our heroes to have feet of clay?



I've noticed a disturbing trend of late: Beating Up Bill. It's suddenly become fashionable to savage Bill Gates in some way or another. Sure, he can laugh all the way to the bank and all that, but why is this necessary?

And Gates isn't the only one. Philippe Kahn has always been plagued by dumb jokes about his weight, his Hawaiian shirts, and his cavalier attitude. When Kahn acquired Ansa Software, he also acquired the dapper Ben Rosen as an influential board member. The jokes were flying thick and fast about how Kahn had to hock his Porsche to buy suits and ties. Har, har.

This bothers me. It's counterproductive and pointless. It also detracts from the issues. As you can probably tell by reading *PC Magazine*, I'm not much on personality cults. We don't write about people or what they're doing with computers. We don't have smiling faces sitting in front of the old keyboard. We don't aggrandize the individual, and my impression is that guys like Gates don't either. But he's the subject of a personality cult anyway. Or maybe it's two cults—one positive, one negative.

The positive cult is the one that never ceases to be amazed at the boy wonder, that hangs on every word, that accepts the Microsoft line as gospel. The negative cult looks at the positive images and tries to find the flaws, the chinks in the armor, the inconsistencies.

The first major public manifestation of the negative cult was an article in the *Wall Street Journal* (September 25, 1987). It recast Gates as a shrewd negotiator who would go to any lengths to get his way. It

gave readers the impression that hardware and software vendors alike were virtually enslaved by contracts, threats, and potential competition.

HOUNDED BY THE PRESS Since then, I've been getting calls from national-level newspapers and TV news people, looking for angles, anecdotes, or even ways to trip Gates up in an interview. There was a little of that before, but nothing like the current interest.

It comes down to a classic PR problem, precisely at a time when Microsoft is trying to keep the focus on all its new products and strategies. This isn't the same class of problem as, say, Johnson & Johnson and poisoned Tylenol, but I don't like the glee with which people are suddenly pursuing him. It's true that Gates is a public figure, with all the attendant risks. But why should he be blindsided the next time he walks out of the building?



There have to be some reasons for this attitude:

Jealousy. Gates is fabulously successful. People are too willing to forget how hard he (and everyone else at Microsoft) worked for it. Also, the big money comes from public trust in what Microsoft is doing, not from some magical pot of gold at the end of the rainbow.

Fear. Software houses resent and fear the power that Microsoft wields in its partnership with IBM. They're also angry at having to build parallel development efforts for two operating systems. Obviously, they've never been in the mini or mainframe computer business, where such things are common. How many operating systems does Oracle support? SPSS? MSA? There will always be a multiplicity of operating systems, and mature software companies will have to deal with that fact. Complaining won't make the users' needs go away.

I've heard it said that Microsoft has an unfair advantage in that it knows the technical innards of OS/2 better and will use undocumented features to make Microsoft applications outperform the competition. Actually, the whole point of OS/2 is to put that kind of programming out of business.

Recalcitrance. Gates has a vision. He states it clearly. But because he has the power to implement it, people resist. After all, they can't empower their dreams, so why should he get to realize his? Never mind that the vision might just make personal computing a whole lot better for all of us, make the industry bigger and stronger than it is now, and make more people

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PC MAGAZINE, May 27, 1986

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■ BILL MACHRONE

rich. It's a lot of work, and some people are evidently happy enough with what they already have.

Also, some of the workstation gurus claim that it's old ground, that they've already invented it. Workstations are certainly among the most advanced computing platforms available. But if they're so great, why are there a couple hundred thousand of them and 10 or 12 million DOS machines? It's more than price. For all the vaunted ease-of-use of Macs and advanced workstations, our familiar DOS machines are approachable and effective. Why should we punish the very people who made it possible?

Pigeonholing. Have you ever noticed that Gates has aged in quanta? He was 19 for a long time. Then he was 25. He was 29 briefly, now he's 31. But he's also moving too fast to stay in a pigeonhole, so people are trying to force-fit him. Some of them want him to be a work forever; others are looking for him to be some kind of vicious tycoon. Which of us will let him be himself?

CROSSOVERS AND CREDIBILITY

After all is said and done, a hidden positive lurks in all this. If folks believe that there's a streak of T. Boone Pickens or Lee Iacocca in Gates, it may make him all the more credible as the chairman of a major software company. Investors may feel more comfortable with the shark rather than the work.

But there's a larger issue. The personal computer phenomenon has finally been discovered by the popular media. And more often than not, they find themselves on the outside looking in. We appear to have built a forbidding wall of technical terms, knowledge, and hardware around us. There are no crossover personalities. You'll never read about a "billionaire playboy and infocenter manager" in *People* magazine. And Princess Di will never do a great *Windows* application. But then royalty don't do windows, do they?

So I have a different solution. Next time some outside faction tries to tear down the wall by tearing down the people, let's just invite them in to have a look around. What they'll find is a bunch of ordinary—if driven—people, having the time of their lives.

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■ JOHN C. DVORAK

COLLECTING HISTORY



Don't throw away that old PC-1. Dust it off, polish it up, and put it into storage. One of these days, when it becomes a collector's item, you'll be glad you did.

As we begin 1988 we can look back fondly on some 13 years or so of personal computing. It's not a long time, but much of its history is already lost. By this I mean that many of the collectible computers of yore are gone forever. This is our last chance to start a collection of early machines.

The premier machine to collect is the old Apple I, which isn't really a computer but a hokey card that the computer hobbyist/mania pieced together and then regretted owning. It's worth about \$1,000 or more already.

The early days of microcomputerdom produced many interesting machines and tons of weird subsystems. I expect that like antique autos, many of these things will never be seen again and only vaguely remembered by old-timers who will say, "Yeah, yeah! I remember that!"

We now have a last-ditch opportunity to grab one or more of the old machines for our collection. Ideally it should be in working condition. My pick to click is the old SOL-20 computer (circa 1977), a machine that should have knocked the Apple off the block except for one or two things. One: it wasn't in color. Two: the company was poorly managed.

The best add-on for the SOL-20 was a Northstar 5¼-inch floppy disk drive. Northstar was the first company to use the 5¼-inch floppy for a small computer. The thing required hard-sectored floppy disks that had ten holes in them. The storage capacity of a Northstar disk was 70K. A double-density controller released a few years later provided 140K!

The real collector's item, though, to go along with a SOL-20, is an old Helios 8-inch floppy add-on. I don't know if any ever worked. If you can't get a SOL, then look for the famous Exidy Sorcerer (circa 1978). It was SOL compatible.

Many old-timers think that the old Altair (the original personal computer) and IMSAI (the original clone) are high on the collectibility list. They were really card cages with a microprocessor and a front panel. You had to toggle switches to get them to boot. Both are very collectible.

I'd recommend looking for some of the oddball machines of those days. The Digital Group computers (from the original not-invented-here—"we-do-it-our-way"—and-go-broke micro firm), the Equinox with its octal front panel in a world of hexadecimal, and above all, the Sphere. The highly promoted Sphere, with its 6800 microprocessor, started a fad of dead-end 6800 machines. Even Altair made a short-

lived 6800 machine. The 6800 machines were such duds that it allowed Motorola to design the 68000 without worrying about backward compatibility—something Intel wishes it could do.

Nobody should overlook a vintage Osborne 1, an Apple III, a John Deere (yes!), the old IMSAI VDP-80 and VDP-40, the IBM 5100 (the world's slowest BASIC computer also ran APL from ROM), a Polymorphic, a Southwest Technical Products computer, the original Heath machines, or any other pre-1980 machine. Also look for an old Jupiter. The company made so few of these that it shipped them to reviewers wire-wrapped and unsoldered. One gullible reviewer thought this was the greatest thing he'd ever seen because of the "space-age" wire-wrapped connections.

When I reminisce about old dead machines and wonder which are the most collectible, I have to fall back on the peculiar Byte-8—a machine made by the Byte Computer Stores. Known for its mediocre power supply, the machine sold poorly and was on the market only for 6 months or so. I think it's the ultimate collectible. I think the more recent ComputerLand Computer may find the same fate. I don't think any were sold. I had a review copy of a ComputerLand machine, and the company demanded I return it even when I offered to buy it.

That's what you learn from old machines. While this business hasn't been around long, history is already repeating itself. It's a short cycle and people have short memories. Now's the time to buy.



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TRBA

■ JOHN C. DVORAK

INSIDE TRACK

Big Is Beautiful, including big monitors, books that are too big, and ideas that lead to big bucks.

The hot item over the next few years will be large monitors. People like the look and feel of a large, high-resolution tube. At the last Comdex one could see the amazing "Thor" from Monitorm (complete Comdex report next issue). Dubbed the "world's largest hi-res monochrome monitor," it boasts resolution of **1,280 by 960 pixels on a 24-inch screen**. This trend is real, and I expect to see more and more of these things in the next year or two.

Behind the scenes in all this is **Sony**, which is preparing to show a **45-inch full-color tube!** The company has already made two prototypes and planned to bring one to Las Vegas, but Sony executives didn't want to risk it in shipping until it goes into production (if ever). A few years back, Sony introduced the first 30-inch glass tube, then Mitsubishi upstaged it with a **36-inch whopper** that is the biggest commercial glass tube available. The 45-inch will probably be seen at the Consumer Electronics Show in Las Vegas.

Obviously a 45-inch tube is of little importance to the PC user. But we all want to **watch football on it!** My take on the whole thing—a high-resolution 19-inch is what the doctor ordered.

Genuinely Interesting Software Dept.: I've always thought that an under-valued class of software is **conversion software**. It's tedious to design, never appreciated, seldom perfected, and hard to find. This esoteric class of software will never make anyone a millionaire. Nonetheless it's as valuable as any language. It can save recording time by months and pay for itself.

It's with these accolades that I'd like to introduce you to **Gotoless Conversion**

and its **BASIC-to-Pascal and BASIC-to-C converters**. They actually seem to work. The BASIC-to-Pascal converter is \$280, the BASIC-to-C is \$375. Gotoless Conversion is located at P.O. Box 835910, Richardson, TX 75083; phone (214) 404-1404.

Here are the problems. This is one of those one-man kind of shops. Much of the work reflects the bias of a Chinese engineer. Statements on the order blank such as "No Credit Card, Sorry!" and "Please read carefully. After opening envelope the refund is not acceptable by any reason" indicate something of a language barrier. Of course, one must assume that this is the **perfect mentality** for someone who's converting BASIC to Pascal.

So I wrote five BASIC programs, and indeed the program converted them all to usable Pascal. I never tried the C converter and assume it to work much the same. My favorite two conversions were a simple 4-line BASIC program that was a for-next loop and a print statement. The exact same program was rewritten in 8 lines of **convoluted BASIC** with goto's and a counter. The 8-line program translated into 52 lines of BASIC code (much chewed up by data typing and useless remarks). The same program in 4 lines dropped to 50 lines of Pascal. So the program may be confused a tad by deranged logic.

Gotoless software is **worth a look** for those of you trying to upgrade your source code to something more structured. Try it.

Dubious Trend Dept.: Back to big! Have any of you seen the huge oversized all-you-ever-wanted-to-know books coming from all the publishers? I was

looking at the Osborne McGraw-Hill 892-page monster book entitled 1-2-3—*The Complete Reference*. It seems like a pretty good deal at \$22.95! It's a little tooooooo thick, though. Besides that there are a **bunch of advertisements** at the end of the book. Is it a book or a magazine? I'm sure that the publisher is aware that certain fourth-class mailing privileges are negated if a publication has ads. I suppose that the book is so heavy that Osborne McGraw-Hill sends it by United Parcel Service anyway. Whatever the case: **get rid of the ads!** And can't we be more succinct?

More on the Subject of BIG Dept.: Worse than the books are the new software packages. You'd think they were marketing cereal or soap with these **boxes full of air**. The newest offering from Microsoft is a case in point. I'm talking about **Microsoft Excel**. It's a huge package. It has to win the homely award as an example of a software product that is better than its packaging. And why is it called *Microsoft Excel* and not just *Excel*? Is there some other *Excel* that we need to know about?

The **biggest joke** about the new spreadsheet package, though, is the "Money Back Guarantee" proudly printed on the box with the proviso "Some restrictions apply—details inside!" To be honest about it, I could not find the details inside—anywhere. Besides that—what kind of bogus guarantee requires that you purchase the thing and crack it open to uncover the **mysterious guarantee**? My advice: put the guarantee on the outside somewhere. There's a lot of white space being wasted.

Final Comment Dept.: We see that a lot of companies, including Ashton-Tate, are trying to get into desktop publishing. They all see that Paul Brainerd of Aldus is **worth \$100 million** from a public offering. They figure that without Paul the business would be a "no Brainerd." Ugh.



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■ JIM SEYMOUR

LET ME SCAN JUST THIS ONE PICTURE . . .



You found the perfect picture for your newsletter. But wait. Can you just include it in your desktop-published document and claim it as your own?

Computers present all kinds of ethical difficulties for the unwary. It sometimes seems that with every advance of the technology, another opportunity develops for the innocent user to go astray.

We're running into that right now with scanning illustrations into desktop-published documents. We're right on the edge of it with the large-scale use of research material from CD-ROMs. And we're creeping up on genuinely troubling problems about the integrity of images we process through our computers for many uses.

When you and I are pulling together documents on our desktop publishing systems, the ease of running graphics of all sorts through that tidy little scanner at our elbows is highly seductive. When we're worrying about holding the long grayscale of a photo, we often don't worry much about the *source* of that picture.

If it's a drawing, photo, or other creation of our very own—say a snap you made with your 35mm of George Hamill, the guy over in shipping about whom you've written this story for the company newsletter, you're in good shape.

But what if you need a nice long, skinny graphic for the bottom of the first page of the newsletter . . . and you just happen to spot a nice long, skinny photo of a sunset in this month's *Life* magazine?

In a couple of minutes, you can run that image through the scanner, maybe tweak the gray scale a little, and presto—you've got your artwork.

You've also got one foot in court. Because that photo was copyrighted by Time

Inc., publishers of *Life*, who in turn probably bought only limited rights to the photo from the photographer who made it—who also has a cause of action against you.

The moral: we can't go around borrowing (read: lifting, using, stealing) art wherever we find it.

LAW AND ETHICS The practical will argue that you probably won't get caught. Sure. Is "probably" good enough? What about your conscience? Will this kind of unfortunate "what's mine is mine, and what's yours is mine, too, if I can get it" attitude become ingrained, part of the PC culture?

On to CD-ROMs. I wrote here a month ago about how much I like Microsoft's new *Bookshelf* reference disk. It's clearly part of a first wave of comprehensive reference works on disk. When we can so easily cut and paste from the disk to our own work, what are the ethical and legal re-

quirements for our use and attribution of that material?

I searched in vain through the blizzard of paperwork in the *Bookshelf* box for details on how the material can legally be used. I found nothing. I suspect that was less an oversight than a tacit admission that Microsoft and the companies from which it licensed the material hadn't themselves figured out how we ought to be able to use their material.

The extent to which we can bring into a larger document a few paragraphs of reference material—not so identified—and in effect claim it as our own work is a big issue, too.

THE COST OF COPYING This season's political wars have reminded us of the high cost of plagiarism. Will the ease of electronic research aggravate the problem? What constitutes—either legally or morally—"fair use" of electronic research materials?

Finally, the big one: As we get the ability to do serious manipulation of graphics on our PCs, who's going to stop the unscrupulous among us from, say, cropping the Reverend Jesse Jackson out of a photo and electronically inserting a perfect-fit image of, oh, maybe Ed Koch?

That's already possible with larger systems. The classic example so far was *Rolling Stone* publisher Jann Wenner's removal of a pistol and shoulder holster from a cover photo of "Miami Vice" heartthrob Don Johnson. And it's leading to serious questions.

The American Society of Magazine



■ JIM SEYMOUR

Photographers, interested in members' financial stakes in their images as well as the integrity of those images themselves, is kicking up a lot of dust about this. Good for them.

SETTING LIMITS Magazine editors and art directors are talking about what the limits ought to be for this kind of ex post facto manipulation of images. Many are eager to use the exciting new tools being

made available to them and, rightly confident of their own ethical integrity, wrongly assume that everyone else in their trade will also act responsibly.

Computer systems capable of that kind of undetectable manipulation of photographs cost a lot more than today's PCs. But the technology is barreling down on our systems at high speed; in a couple of years we'll be faced with the opportunity to snatch images of famous people from magazine pages, mix and match them in improbable combinations and settings, then electronically paste them into our desktop-published pages.

If some, unchallenged, are engaging in wholesale theft of others' work now, by lifting images wherever they find them, and if others are already slaving at the

■ When we can so easily cut and paste from the CD-ROM disk to our own work, what are the ethical and legal requirements for our use *and attribution* of that material?

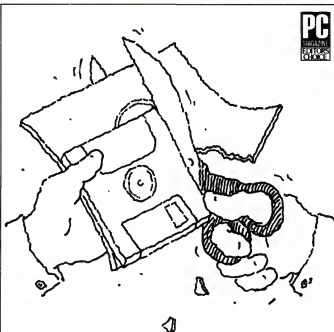
possibility of "writing" electronically cut-and-pasted term papers for a fee, and if that image-manipulation software and computer power winds up on our desks, as it inevitably will . . .

Too often ethical constructs seem distant abstractions, angels-on-pinheads exercises for the kind of people who read Plato and Kant the way you and I read Garfield and Peanuts.

But these are real issues, and if we let ourselves slip so far over the line that we ignore or condone the kind of innocently motivated lifting of artwork that has begun to appear in the desktop publishing community, we're going to lose a lot more than our innocence.

Let's start asking the hard questions now. In public.

28



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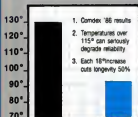


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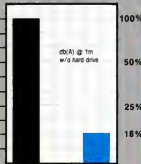
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■ STEPHEN MANES

NEATNESS: IT REALLY DOES COUNT



Some products make you smile the instant you begin working with them. Others produce sour faces and exquisite agony. The difference, in a word, is neatness.

Computer novices invariably have one response when they find out what some of us do all day. "Wow!" they exclaim. "It must be great to get to play with all that neat hardware and software!"

A shrug and a sigh are the usual replies. If all hardware and software were as terrific as the best, fooling around with it might well be the third or fourth closest thing to paradise on earth. But like any other business, the computer industry is chockablock with the slipshod, the stupid, and the just plain boring. Any veteran of hundreds of product demos tends to adopt a certain air of hostility when confronted with expensive hardware that can't produce files in any format but DCA, lowball software that's philosophically opposed to displaying color, and arrogant programmers who insist their new shifted-number-key "!!@#5% &*()'' interface will be the industry standard by this time next year.

KNOW IT WHEN YOU SEE IT "Neat" hardware and software are in all-too-short supply, and we could use a lot more of them. Neatness—the quality that makes you say "Hey, neat!"—is like pornography: You can't define it, but you know it when you see it.

Example: Canada's Electrohome (which ought to consider changing its forward-looking-for-the-fifties name, more suitable to a manufacturer of vacuum cleaners) has quietly been releasing its newest multiscan monitors in two flavors. You can get them with the industry-standard short-persistence phosphor, whose

inherent flicker makes sensitive souls like me physically ill, or with a special long-persistence phosphor that virtually eliminates the flicker problem. The long-persistence models are slightly less bright and occasionally cause a "vapor trail" effect, but for uses that aren't heavily graphics-intensive, they're terrific. And their uniqueness adds a dash of neatness to a product category that's usually a thudding bore.

The neatness of Zenith's FTM monitor is even more immediately evident. When you first stare at the thing, you're positive it has to be concave. Demonstrators tend to carry along straightedges to dispel that notion. The product is unique in many other ways as well. Neat.

The Brooklyn Bridge's neatness is its simplicity. Its competitor, Lap-Link, offers all sorts of software extras. The Bridge simply lets you treat the disks in your laptop computer as extra drives and use the DOS commands, utilities, and programs

you already know. Learning curve: virtually zero. The concept "Gee, I already know how to use it!" is possibly the most underexploited form of neatness in the PC universe. It's also in large measure what made the Macintosh so successful—and, yes, so darned neat.

CONFIDENCE AND TRUST Neatness inspires confidence and trust. If a product's look and feel knock you out the first few seconds you use it, you'll stick with it far longer than if it offends you from the get-go. Hotline's user interface gets you up and running fast; its help screens let you plumb its considerable depths once you're comfortable with it. SideKick's considerable neatness managed to maintain the program's lead even after competitors offered gobs of extra features.

In operation, Plus Development's Hard-Cards are hidden from view. But they look neat even before you plug them in, which is a lot more than the competition can say. You feel confident they'll work, and they do. Run an install program, and you're off and running. Simple. Easy. Neat.

Neatness can compensate for minor failings. The Zenith Z-181 and Z-183 laptop machines are virtual definitions of neatness. Pop one open and the dazzling screen attracts fascinated bystanders the way a flame attracts moths. The screen and general design are such knockouts that they distract buyers from a flurry of annoyances they discover later on.

Neatness can even bedazzle you into wondering how you might actually use a class of product you never considered be-



■ STEPHEN MANES

fore. AT&T's Targa and new Vista boards are undeniably neat; so are Howtek's new color printer and scanners. The demos just knock your socks off. When you pull your socks on again, you realize you have a

burning desire to find a use for the things just so you'll get to play with them.

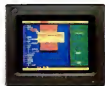
Sometimes the very idea of a product category is so neat it can generate momentum when the reality is not quite as rosy.

The idea of desktop publishing: neat. The reality of desktop publishing programs: not so neat. The idea of PostScript printers, which give you lots of excellent fonts in an infinitude of sizes: neat. The speed of most PostScript printers: not so neat.

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CIRCLE 121 ON READER SERVICE CARD

NOT NEAT Some things aren't ever neat. Operating systems, for openers. You're stuck with them, but the only neat things about most operating systems are the slick utilities clever programmers write to make them bearable.

The user interfaces of programming languages are getting neater all the time, but only die-hard programmers will claim neatness for any language itself. Databases are rarely neat, though users of *Paradox* and *Reflex* might disagree.

Word processing programs are almost never neat, and hardware limitations are partially to blame. What might make a word processor neat is a full 8½- by 11-inch screen (8½ by 14 for law firms) showing you everything, and I do mean everything, you'll see on your final printed page, right down to headers, footers, footnotes, fonts, you name it, with room for menus up top. Alas, the closest candidates at the moment are running on the Mac.

Neatness is highly temporal. Many things were neat when they arrived, but aren't anymore. The Tandy Model 100. The 10-megabyte hard disk. 1-2-3. AT-class speed. Neatness *fugit*.

So does time. The very term *neat* doesn't seem neat enough. The *New Dictionary of American Slang* claims the coinage was extremely popular with 1920s teenagers. I was going to go with *nifiness* until that reference work informed me the term dates to the mid-1800s.

Only 3 years ago Bill Budge, the baby-faced computer-pinball wizard, wrote an article positing an antithesis between *square* and *groovy*, but that seems hopelessly dated outside the Surfin' State. *Swell*, *hip*, *hep*, *zooty*, *bad*, *bitchin'*, and a few terms our copy editors would excise don't seem to do the job, either.

The computer domain has already graced our language with dozens of useful new terms, so perhaps it's our job to come up with a decent synonym for *neatness*. If the hits just keep on coming, we'll have plenty of opportunities to use it.

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THE BEST OF 1987

(AND SOME OF THE WORST)

It was the best of times, it was the worst . . . " No, no. "It was a dark and stormy . . . " Well, sort of. "It was," she said to him, eyes blazing, as she ripped . . . " Oops, wrong genre.

It was . . . fascinating.

Maybe the most interesting year in the short history of the personal computer business, 1987 was full of the kinds of odd turns, great hopes, brilliant products, and unfulfilled promises we've come to expect from the PC whirl. At year's end we stand puzzled, charmed, hopeful, angry, gratified. And more than a little weary from wading through the biggest avalanche of new products (if not necessarily new ideas) we've seen in years.

Those old enough to remember the mid-sixties American version of the British television hit "That Was the Week That Was" will recall the fast-paced song-and-dance through the previous week's news that opened each program. Here, in a style reminiscent of "TW3" is a whirlwind overview of the year's highlights and low-lives, and of the circumstances that brought us some of the products we've identified on the following pages as the very best of 1987.

THE APRIL REVOLUTION IBM got the biggest headlines of the year with the double-barreled announcement of the new PS/2 series and the OS/2 operating system. The news came on April 2, neatly dodging by 1 day a date that wags suggested would have been a better choice. But jokes the

PS/2s weren't—though they did make April fools of many pundits who had confidently detailed in print their functional incompatibilities with existing PCs and their inability to run standard, existing PC software.

But Big Blue stayed in the open-architecture camp and left plenty of opportunity for others to play its game. At least there is the appearance of an open architecture: PC compatible-makers and add-in board vendors—still trying to figure out what happens on the Micro Channel bus, when it happens, and why—would argue that the new boxes aren't nearly so open as they seem. And AST and Orchid, bopped on the head by IBM's lawyers for daring to refer to PS/2 compatibility in print without suitable deference to Blue's trademark, would surely agree.

By late summer IBM seemed to be claiming a trademark not only on the

"PS/2" marque and its idiosyncratic graphic using those letters, number, and symbol, but even on the digit "2" itself. In one of the best lines of the year, former IBM and Tandy executive Girdham Beauchum, now a VP at Dell Computer, explained that "when you get really rich, you can actually buy the rights to a number, and that's what IBM's doing: they just figure they own the number 2 now."

REMEMBER THE ALAMO If IBM's out after ownership of the number 2, Compaq made clear its intention to hold on to place number 2 in the PC hardware sales rankings—and maybe, by exploiting some IBM hubris, to finally edge out from under that Blue shadow and into its own spotlight. From the day of the PS/2 announcement, Compaq president Rod Canion preached the gospel of "industry standards," in the form of the AT bus and 5¼-inch floppy disks.

Along with other PC industry executives, Canion claimed repeatedly that the Micro Channel architecture—the single distinguishing characteristic of the PS/2s over other up-to-date PC-compatible designs—wasn't necessary in order to get better performance.

In September, Canion delivered on that promise with Compaq's Best of '87 Deskpro 386/20. The new box not only upped clock speed 25 percent, from 16 to 20 MHz; Compaq also added sophisticated memory-caching, fast ESDI-interface hard disks, and the possibility of adding the clever little Weitek coprocessing board and an 80387 math chip, for at least a 50 percent increase in speed over IBM's top-

PC Magazine's authors and editors choose the most significant contributions and most favored products of the year that brought us the Personal System/2 line, EMS 4.0, Windows/386, and much, much more.

THE BEST OF 1987

Toshiba, already lapped by Compaq in the power-portables race, took a second, much larger blow when word leaked out in midyear that a subsidiary had circumvented Western export controls in collusion with a Norwegian firm to ship high-tech submarine-propeller-polishing equipment to the Soviet Union.

of-the-line PS/2 Model 80 and Compaq's own original Deskpro 386, which was one of our Best of '86 picks.

The Texans also gave in, if only a bit, on their crusade for maintaining their definition of industry standards: 3½-inch microfloppy disk drives are available on the new Compaq desktop machines—but only as add-on options. The machines maintain the revered AT bus, and so accept IBM-standard add-in cards.

What was it that Dizzy Dean said? Something about "it ain't braggin' if you can do it"?

PORTABLE POWER Compaq also impressed with two new lunchbox portables, the Portable III and the Portable 386. With a 12-MHz 80286, fast 40MB hard disk, and gas plasma display, the Portable III made a big splash when it was introduced in February, taking leadership in the heavy, powerful, AC-power-only portable competition away from Toshiba.

Then in late September, Compaq one-upped itself, rolling out the Portable 386. A Portable III look-alike, the new box packed 20-MHz 386 performance and (optionally) a sub-25 millisecond 100MB hard disk into the same case, creating what is either the largest, heaviest, and most powerful portable PC extant or the world's smallest file server for LANs. Or both.

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It also led to sagging sales for Toshiba's lap portables and other computer equipment, as dealers and corporate buyers alike wondered what their clients would think when they spotted Toshiba gear in use. Already faced with import duties on 16-bit lap portables, Toshiba (and other Far East producers) made plans to shift production to the United States.

By the fourth quarter Toshiba sales had come back, helped by the introduction at Fall Comdex of the powerful high-end 80386-based T5100 laptop and by the delivery of the compact, lightweight T1000 (which was first shown at Spring Comdex) at the low end.

SOFTWARE WARS The software business was more chaotic in 1987 than it had been for years—which was a welcome change from the snoozy mood prevailing since the introduction of the PC AT in August 1984, when hardware jumped ahead of software and kept moving further ahead.

The big event of 1987 in software went hand in hand with the big event in hardware: the joint IBM-Microsoft announcement of the OS/2 operating system on April 2, as part of the hoopla surrounding the PS/2 rollout. Finally, we're about to get a new operating system able to exploit some of the advantages of the Intel 80286 chip found in the 3-year-old PC AT and its many clones. Gosh.

Operating System/2, which IBM has been fine-tuning for some time, and its generic equivalent, MS-OS/2, which Microsoft's OEM customers should be getting shortly, provide relief for the biggest complaints of MS-DOS/PC-DOS users—who should be able to buy the product in the first quarter of 1988.

More memory, multitasking, interprocess communications... they're all there in OS/2. Adopting OS/2 means buying a lot more memory (fair enough: we said we wanted more memory, right?) and setting aside a meg or so of our hard disks for OS/2 (also fair enough, given the disk-space requirements of other advanced operating systems). Unfortunately, exploiting the advantages of OS/2 also means buying new versions of your favorite programs (once they've been rewritten for OS/2), or running existing versions within OS/2's "compatibility box," without access to the new OS's features and with some compromises in performance.

WAITING FOR PM That first release of OS/2, due in the first quarter of '88, will be superseded later in the year (assuming Microsoft and IBM stay on track) with OS/2 Version 1.1, which is where things begin

to get interesting. Version 1.1 will include the Presentation Manager interface, a modified version of *Microsoft Windows'* mouse-driven graphic interface.

For those who are put off by the revolutionary nature of the changes in OS/2 and need to get past the barriers of present MS-DOS versions, but want to stay within the comfortable MS-DOS world a while longer, 1987 also offered another path: a vastly improved version of the Lotus/Intel/Microsoft expanded memory specification, Version 4.0, introduced in August.

The new LIM 4.0 also offers access to much more than 640K of memory, multitasking, and interprocess communications—though, like OS/2, it offers those advances only with programs rewritten to recognize LIM 4.0. Unlike OS/2, however, LIM 4.0 allows users to run existing versions of their programs in MS-DOS's traditional 640K of base memory without compromise.

VIRTUAL NIRVANA The third big move in systems software and its extensions during 1987 was the September introduction of *Microsoft Windows/386*. Finally, buyers have a reason to spring for those 80386 PCs beyond using them as turbo ATs. Though *DESQview* has filled a niche as a kind of control program for multitasking (and on machines less powerful than the 386s, at that), *Windows/386* seems certain to take over the leadership among "386 control programs."

By exploiting the "virtual 86" mode of the 386 chip, *Windows/386* allows users to set up several separate virtual (or imaginary) computers within their 386 PCs. But there's nothing imaginary about the convenience and performance improvements delivered by *Windows/386*. Stick *Lotus 1-2-3* in one virtual machine, *dBASE* in another, *WordPerfect* in another, some utilities in a fourth, perhaps a comm program in a fifth—and take off. Many programs that are highly resistant to *Windows 1.00* through *1.04* run fine under *Windows/386*. The program's ability to pop up among full-screen, windowed, and (finally!) truly concurrently executing programs allows users to fine-tune their individual PC styles, moving from application to application much faster, and (also finally!) cutting and pasting data reliably from one pro-

gram to another through *Windows/386's* clipboard.

It's hard to know now just how important will be the eventual impact of these products, the seeds for which were sown in 1987. But it's a fair guess that what began on the systems-software level in 1987 will continue to ripple throughout the PC-compatible world well into the 1990s.

THE BEST GET BETTER In applications software, 1987 delivered some gems, as vendors such as Ansa (*Paradox*) and Microsoft (*Word*) refined already superb programs into new, even-better releases. More programs learned about mice, pro-

By exploiting the "virtual 86" mode of the 386 chip, *Windows/386* allows users to set up several separate virtual (or imaginary) computers within their 386 PCs.

gram code grew larger (but, paradoxically, often faster), and we began to see programs that reflected a better understanding of the needs of those using multiuser versions of programs on LANs or superminis.

Lotus, whose customers love the software but often despair over the company's policies, took steps to win friends among its customer base by setting out, during "Lotus Week" in April, strategic directions for future releases.

The cynical will always believe that was in anticipation of, and an attempt to deflect the impact of, the nearly simultaneous announcement 6 months later of four exceptionally good and interesting new spreadsheet packages for PCs and compatibles: *Quattro*, a fast and flexible \$195 competitor from Borland; *Microsoft Excel*, an elegant, *Windows*-based program from Microsoft; *Suprass*, a brilliant and lightning-fast super-1-2-3 from Seymour Rubenstein of *WordStar/MicroPro* fame; and *Lucid 3D*, an innovative, pop-up everyman's spreadsheet from PCSG.

During 1988 we'll see whether Lotus's statement of direction for future 1-2-3 releases, combined with the impact of 1-2-3, Release 3 (due during the first half of '88), and 1-2-3/G (or graphical interface, designed for OS/2's Presentation Manager and ready, Lotus says, by the time OS/2 1.1 will be shipped), is enough to keep the rows-and-columns crowd within the Lotus corral, or whether the 1987 *glasnost* at Lotus was too little, too late.

GRAPHICALLY SPEAKING Graphics programs got new features, new respect, and new attention during 1987. Lotus's *Freelance Plus* rode to the top of the sales heap and the revamped *Graphwriter II* turned the heads of corporate MIS managers, making the company's 1986 acquisition of Graphics Communications, the developer of both programs, look like an incredible bargain.

Software Publishing Corp. dropped the "P" in *Harvard Presentation Graphics* and, in the new version, called simply *Harvard Graphics*, taught the PC-software industry lessons about interface design, intelligent features selection, and the importance of printer drivers capable of delivering high-quality results even on simple dot matrix machines.

Micrografix, which has invested a lot of time, money, and good faith waiting for *Windows* to catch on, added during 1987 new *Windows Graph* and *Windows Designer* programs to its *In-a-Vision* and *Windows Draw* products to round out a coherent, utterly professional product line.

While Micrografix's line of high-quality *Windows* applications has been widely praised, less well known is the crucial role the company has played in developing *Windows* output drivers on a contract basis for Microsoft.

If Microsoft finally succeeds, as now seems likelier, in establishing *Windows* and its Florida cousin the Presentation Manager, as the standards for PC software interfaces, the people in Redmond should mutter fervent thanks and bow deeply toward Micrografix's Dallas offices every morning when they check the stock price.

THE DESKTOP IMPERATIVE Until 1987, PC owners could only envy Macintosh users for the array of desktop-publish-

WHEN YOU'RE HOT, YOU'RE HOT; WHEN YOU'RE NOT . . .



Compaq With sales for the Deskpro 286s soaring, three hot 386 machines (more if you count hard-disk variations) and a reputation as the leader in performance and intelligent innovation, Compaq comes out of 1987 with enormous momentum. Add gross margins over 40 percent and a secure hold in the Fortune 500 and Compaq has the financial clout, as well as the boxes, to assure its role as a long-term player. Now give us a fast lap-portable, Rod. Please.



MicroPro Yeah, we know: MicroPro's on everyone's list of the walking dead. We're surprised to find it in the Best Of/Worst Of middle category, too. But 1987 saw shipment of *Wordstar Professional* 4.0 and a CP/M version (yes, Virginia, CP/M's still important somewhere: Europe), and, *mirabile dictu*, rising revenues—up 18 percent over last year, to \$12.3 million, in the June–August quarter—and even some profit: \$781,000 in that same period, versus a loss of \$342,000 a year earlier. A new version of *Wordstar 2000* also made it to market in late '87, including a special vertical-market version for lawyers. Despite rumors of sagging upgrade revenues and questions about where he takes MicroPro from here, new president Leon Williams showed during his rookie year that he may indeed have the touch.



PCSG It's tough to move up from the Tandy Model 100 world, but two companies—Dallas's Personal Computer Support Group and Seattle's State's Traveling Software (Lap-Link)—have made it. PCSG began with *Lightning*, a smart PC-

compatible disk-caching program; the company with the Breakthru 286 accelerator board, delivering a new price-performance level for speedup add-ins; and this year it hit its stride with *Lucid 3D*, a fast, intelligent pop-up spreadsheet that fits into 75K RAM. Maybe we should get these guys to write a 386 operating system in oh, say, 24K.



DCA IBM's introduction of the PS/2s and their incompatible bus knocked sales of DCA's legendary IRMA board for a loop over the summer, as buyers wondered what else IBM had up its connectivity sleeve. Then DCA's acquired comm program, *Crosstalk Mk. 4*, came to market—years late and, while indisputably powerful, a nightmare of complexity. Looks like a lot of us are likely to go on Crosstalk with "Classic Crosstalk." By fall, IRMA sales were coming back and DCA had announced a PS/2 board. But things may never be the same in the OS/2 world as they once were for the Georgia giant. Will that mean no more Comdex parties with the Beach Boys? Hmmm . . . let's rethink this.



IBM OK, make fun of the PS/2 Model 30 all you want. And the Model 25. And the Model 50's slow hard disk. Bill Lowe says IBM shipped a million PS/2s in the first 6 months after it was announced in early April, and Bill Lowe doesn't tell fibs, "no PC II" notwithstanding. That's twice the average annual shipment rate of IBM PCs from the time IBM introduced the first one in August 1981 till the PS/2s appeared. IBM's determined to make the PS/2s big hits, account-control

machines to keep MIS management, IBM stockholders, and maybe even you and me happy. IBM can do it, too, if it ever gets serious about the line.



Novell So what if Microsoft coziered up to Novell's arch-competitor, 3Com, for help writing the LAN Manager part of OS/2's code? IBM hasn't yet said LAN Manager will be its choice—and Novell has already shown with *Advanced NetWare* that it knows a lot more about writing fast network software than the people who wrote *Microsoft Networks* (aka the *IBM PC Network*, aka the *Slug That Ate Redmond*). Novell stands astride the PC-LAN world like a digital Colossus astride a wired-up Rhodes. Don't look for that to change in 1988.



Ashton-Tate Poor Ashton-Tate. After paying too much for *MultiMate*, at exactly the wrong moment, the company watched the word processor go into a market slide. After paying too much for the *Char-Master* series of graphics packages, Ashton-Tate watched superior programs come to market and gobble up its market share. After not updating *dBASE III Plus* forever, it watched Ansa's *Paradox* get good press, good reviews, and lots of its customers.

To top it all off, now Ashton-Tate has to watch Blyth Software's *Omnis Quartz* sop up the *Windows DBMS* market, worry about *Migent Software's* Emerald Bay plans in the 386 DBMS arena, and wonder what IBM (and its ill-disguised partner, Lotus Development Corp.) have in mind for the database that supposed to be built in to OS/2's Extended Editions. What's a guy to do, Ed?



Tecmar Marty Alpert built Tecmar into the first important PC add-on-boards supplier, and built a reputation for integrity when he turned down inside poop on the new PC AT from disaffected IBMers. But when sales went south, Tecmar was taken over by one of the best venture capitalists in the business, and now Marty's across town, trying to build another Tecmar around the PS/2 bus, while the real Tecmar is stuck with old boards, old tape backup units, and what sounds, too often, like an old business plan. Maybe VCs can't bail out every problem child.



Symantec Start with one of the best management teams in the software business. Add a superb, widely useful product in the form of *Q&A*. Stir in the smarts to start up a software-utility publishing company, Turner Hall, on the side, to provide some quick cash flow to survive the first year or two. Then acquire the best project-management package (and its developers), and the best outliners and desktop-presentation package (and their developers), the best Macintosh in-house electronic-mail program and program-development tools (and their developers). Then sit back and make money. Ladies and gentlemen, we give you . . . Symantec.



AST Look, we think things have turned around there, too. That's why they're not on our thumbs-down list, despite the huge sag in the name-brand/high-end add-in board business. This year AST introduced the hottest 286 PC in the business, broadened the line by OEM deals for scanners and monitors, and asserted leadership in the new era of open Macintoshes. The question lingers, though: Is there life after the SixPack?



Micrografx Maybe virtue and patience are their own rewards. The first serious player in the Windows-applications software market, Micrografx has put up with a lot while waiting for the world to catch on to the desirability of a graphical interface. Meanwhile *In*a*Vision*, *Windows Draw*, *Windows Graph*, and now *Windows Designer* mark four very interesting points along a path of increasing sophistication and functionality in the Windows-compatible graphics software market. Companies interested in acquiring smart Windows products and savvy Windows developers begin by flying to Dallas, then lining up at the Micrografx doors. But the Grayson brothers say they aren't ready to sell. C'mon, guys: there must be some number you'd accept, huh?



Irwin Magnetics At a time when every trend in PCs pushes toward greater performance, Irwin makes a profit selling relatively low-performance servo-track tape backup units. They've got 'em up to over 60MB capacity now, but sooner or later the demand for faster, larger-capacity backups will overcome the technology around which Irwin has built its business. Will that point come in 1988?



Microsoft So you think OS/2 may be late, you don't like Windows, and you think mice belong in Garfield's mitt, not yours. Have you seen these guys' balance sheet? With IBM as a strategic partner, the continuing revenue stream from MS-DOS, increasing revenues from PC applications, dominance of the Macintosh apps market, and the future prospects of OS/2 (at 3 times the price of MS-DOS and up), Microsoft enters 1988 very well positioned, indeed.—Jim Seymour

ing (DTP) power tools available for the Mac. In 1987, the long-awaited tide of DTP products for the PC hit the beach and changed the equation for all those putative publishers.

In January, Aldus shipped the PC-compatible version of *PageMaker*, which was soon joined by Software Publishing's *Harvard Professional Publisher* and Version 1.1 of Xerox's *Ventura Publisher Desktop Edition*.

Even better, Z-Soft released *Publisher's Paintbrush*, the logical extension of *PC Paintbrush Plus*, and gave DTPers an unmatched set of tools for manipulating type and graphics before pasting 'em into their *PageMaker* or *Ventura* pages.

Software Publishing exited the high-end DTP market in August with a bigger bang than accompanied its entry in January—by showing such class and respect for its *Harvard Professional Publisher* customers that the company set a new standard for the industry.

Upon its withdrawal of *HPP*, a so-so product trying to compete with giants, SPC announced it would continue indefinitely supporting those who'd bought *HPP* and, as a mea culpa, was giving them free copies of the superb \$395 *Harvard Graphics* package, as well as copies of its new low-end entry *First Publisher* (known "in an earlier life," as Shirley MacLaine might tell us, as *TMaker's Clickart Publisher*).

Every other company in the software business, from IBM down to the legendary two guys in a garage apartment in Keokuk, should take note.

PSST: WANNA HOT TIP? Initial public offerings, strategic alliances, and sneaky mergers and acquisitions were a large part of the PC scene during 1987, reflecting the paradox of an industry undergoing consolidation while following the exploding-universe theory of growth.

Among the more-promising strategic alliances of the year were IBM and Lotus, Microsoft and 3Com Corp., Sun Microsystems and Centram Systems West, and 3Com and Bridge Communications—with the players in each case dealing from strength on both sides.

In the M&A business, Symantec acquired Breakthrough Software Corp. for

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Time Line, as well as Living Videotext for *ThinkTank*, *More*, and *Ready!*; and it merged with Think Technologies for *In-Basket* and Mac development tools. The latter two deals also form the core of a new Macintosh development group. Microsoft acquired Forethought (*Powerpoint*) and bought into Sybase's DBMS action. Lotus bought Datasoft for its CD-ROM business,

This year saw an explosion of new hardware products in areas not previously seen as very important.

leveraging the earlier acquisition of *Bluefish* Technology. Borland bought Ansa Software, both for *Paradox* and to get the best field-sales team in the PC business on board for *Quattro*'s September rollout.

Going public remains the fastest way to get rich since Willie Sutton retired; just ask Paul Brainerd, president of Aldus Corp., who cashed about \$4 million out of the flashiest PC IPO of the year—and kept stock worth \$160 million or so. This wasn't the year Microsoft went public (that was 1986), but it was the year a rising market for Bill Gates's Microsoft holdings made him the personal computer industry's first billionaire.

THROUGH A SCREEN, DARKLY As full as our plates are with the riches and spoils of 1987, 1988 should see a rich, rewarding, and ironic range of candidates for Best of '88. And some answers to what, from today's perspective, seem tough questions. Though OS/2 1.0 will appear, who will release software for it—rather than waiting for the clearly preferable Version 1.1, which, with its Presentation Manager, will require a whole new approach to designing a program's interface?

And as impressive as the OS/2 specs are, a powerful wave of resistance to wholesale changeovers to OS/2 rose during the last several months of 1987. Will that cautious preference for MS-DOS—perhaps emerging as the "Classic Coke" of operating systems—so slow OS/2's

adoption that, combined with the free-fall we're seeing on prices for 80386 hardware, the real sea change won't occur till the 386 version of OS/2 comes along? And if so, will Microsoft lose its shirt on OS/2's development costs, not beginning to recoup till "OS/3" appears?

How about IBM's PS/2 line? Will Big Blue, or third-party vendors, deliver on some of the exciting possibilities of the Micro Channel bus—such as simultaneous coprocessing, using two or more microprocessors, perhaps from different chip families—or will the Coming of Age of the PS/2s have to wait another year, maybe even into the 1990s?

SCANNING FOR ANSWERS This year saw an explosion of new hardware products in areas not previously seen as very important. Many, from higher-resolution laser printers to scanners to fax cards, still must address real problems before becoming widely useful tools.

Image- and character-scanners, for example, appeared by the dozens. But the software for differentiating between an "a" and an "e"—and more, between an "a" in Times Roman and an "a" in Garamond—is still not very intelligent nor very effective, at least until you get into the \$10,000 to \$12,000-and-up range of the Kurzweil machines. Will 1988 bring better optical character reading software for these ubiquitous scanners?

And for image capturing, we're now seeing gray-scale scanners that move beyond the 16 gray-scale steps of current-generation units to 64 steps and more.

But who will do something about the megabyte-and-up file sizes created by scanning full-page images with long gray scales? Will we really be moving stacks of megabyte-sized snapshots in and out of our desktop-published pages? Isn't intelligent file compression at scanning and decompression at print time an important part of the desktop scanner world?

LOOK AND STEAL Next year software vendors will show us their ideas on how programs should look (with character-based or graphical interfaces), how they should talk to one another (through *Windows*' clipboard exchanges, LIM 4.0, or OS/2 interprocess communications), and

CONTRIBUTORS

The following talented and opinionated people participated in The Best of 1987:

PC Magazine editors: Bill Howard and Paul Somerson, executive editors; Mitt Jones, staff editor; Bill Machrone, editor and publisher; Philip F. H. Rose, PC Labs project leader; Gus Venditto, senior editor; Craig L. Stark, senior editor, technical columns.

Contributing editors: Frank J. Derfler, Jr., Stephen Manes, Charles Petzold, Winn L. Rosch, Neil J. Rubenking, Jim Seymour, M. David Stone, Ethan Winer.

Free-lance writers: Howard Marks, Edward Mendelson, Joel N. Orr, Alfred Poor, Robin Raskin, Richard Hale Shaw.

how they should work when several users ask simultaneously to see a record (by selective or nonselective locking, with or without identification of the current primary user of the record, and with or without real-time updating from others' input).

Hardware vendors will strut their stuff with ideas that are now surfacing, such as speeding up PC operations (through interdisk interleaving with two hard disks operating simultaneously under OS/2, for far faster data transfer than presently available), more effective fault tolerance on local area networks (through multiple writes to multiple disks), and the creation of very fast "database servers" functioning as multiple servers on LANS (through use of the 386 chip's features and better LAN management tools available under OS/2).

As wild and woolly as this year has been—and as exceptional as we find the products honored on the following pages—hold onto your hats. Forget about waiting for the fat lady to sing: we're still watching the curtain go up on the second generation of personal computing.—Jim Seymour

Jim Seymour is a contributing editor of PC Magazine.

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ALR 386/220

"Uhh, excuse me; I must have the wrong price sheet here. This says I can buy a 16-MHz 80386-based PC for . . . uhh . . . \$1,990. And a 20-MHz system for . . . well, it looks like it says \$2,485. That must be wrong. Are these dealer prices?"

No. You must have the Advanced Logic Research price sheets, because ALR has shown a determination to drive 386 PC prices down far earlier in the production- and life-cycle curves than any other vendor, and is doing so

with impressive machines.

The ALR 386/2s, at 16 MHz, have set the standard for the very lowest-cost nationally distributed 386s. The 386/220s, with 1MB RAM, are doing the same thing for 20-MHz 386s. Prices run about half those of IBM and Compaq and much less than those for similar machines from other good clone shops.

ALR delivers almost all of its 386 systems as floor-standing "tower" PCs, which users love. The systems use fast 32-bit memory, full-track buffering for hard-disk reads, 32-bit VDISK disk-caching, and other performance tricks to get a lot out of that fast processor speed. ALR machines don't quite match the performance of the very fastest 386 PCs (which rely on lots of static RAM, ESDI hard-disk controllers, and other expensive steps to wring the last bits of better performance out of 80386s), but they come close—at far lower prices.

ALR has come out of nowhere over the last 2 years to earn a spot in the sun among



important PC-compatible makers. In 1987, it claimed and held a highly visible piece of turf in the low-priced performance-PC arena.

—Jim Seymour

FACT FILE: ALR 386/220; Advanced Logic Research, 10 Chrysler, Irvine, CA 92718 (714) 581-6770. List Price: \$2,485. Reviewed: September 29, 1987, page 91. CIRCLE 890 ON READER SERVICE CARD

AST Premium/286

Although 1987 may go down as The Year of the 386 because of the arrival of supercharged 32-bit CPUs on corporate desktops, it will not be The Year the 286 Died.

That's due in large part to machines like the AST Premium/286.

The new breed of hot PC-AT-class machines has given renewed life to the potentially outdated 80286 designs. As described in its initial review in *PC Magazine*, where it garnered Editor's Choice honors, the Premium/286 is one of the most solidly constructed AT clones available.

Clone is an unfair moniker, however, since AST has

gone far beyond IBM's original design to coax state-of-the-art performance from the 286 chip. There is no memory on the motherboard; instead, it resides on a custom memory card that has its own zero-wait-state connection to the CPU. You can mount up to 2MB of memory before you will need to use another memory card.

The CPU itself runs at a fast but reliable 10 MHz and can be stepped down (through the keyboard) to 8 or 6 MHz if required. At its top speed, it is a screamer; in the PC Labs benchmark tests, an 8-MHz IBM AT took more than 75 percent longer to perform the Conventional Memory test. The computer is built around the Chips and Technologies AT chip set and uses the popular Phoenix ROM BIOS.

AST sells the Premium/286 in a variety of configurations, ranging from a "stripped" version all the way to full-blown configurations that include 40MB hard disks and EGA adapters. The Premium/286 is a powerful, fast machine at a bargain price from a well-known name in the micro industry—



Introducing the two on earth



The new COMPAQ DESKPRO 386/20™

The world now has two new benchmarks from the leader in high-performance personal computing. The new 20-MHz COMPAQ DESKPRO 386/20 and the 20-lb., 20-MHz COMPAQ PORTABLE 386 deliver system performance that can rival minicomputers. Plus they introduce advanced capabilities without sacrificing compatibility with the software and hardware you already own.

Both employ an industry-standard Intel® 80386 microprocessor and sophisticated 32-bit architecture. Our newest portable is up to 25% faster and our desktop is actually up to 50% faster than 16-MHz 386 PC's. But we did much more than simply increase the clock speed.

For instance, the COMPAQ DESKPRO 386/20 uses a cache memory controller. It complements the speed of the micropro-

cessor, providing an increase in system performance up to 25% over other 20-MHz 386 PC's. It's also the first PC to offer an optional Weitek™ Coprocessor Board, which can give it the performance of a dedicated engineering workstation at a fraction of the cost.

They both provide the most storage and memory within their classes. Up to 300 MB of storage in our latest desktop and up to 100 MB in our new portable.

It simply works better.

most powerful PC's and off.



and the new 20-MHz COMPAQ PORTABLE 386™

Both use disk caching to inject more speed into disk-intensive applications and both will run MS® OS/2™.

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COMPAQ®

■ THE BEST OF 1987

a formidable combination that should satisfy anyone seeking an alternative to the higher-priced 386 machines.

—Alfred Poor

FACT FILE: AST Premium/286; AST Research Inc., 2121 Alton Ave., Irvine, CA 92714 (714) 863-1333 **List Price:** Model 80 with 512K RAM, 1.2MB floppy disk drive, DOS, BASIC, \$1,995; Model 90 with 1MB RAM, 3GPlus EGA video adapter, \$2,495; Model 120 with 20MB hard disk, \$2,995; Model 140 with 40MB hard disk drive, \$3,495; Model 170 with 70MB hard disk drive, \$3,995. **Reviewed:** April 28, 1987, page 242.

CIRCLE 689 ON READER SERVICE CARD

AT&T Vista Videographics Adapter

There was far greater potential for graphics breakthroughs in 1987 than most users realize. IBM's new VGA standard is nice, but it pales beside what AT&T's Indianapolis Imaging Center is up to. The Imaging Center is the small working group that brought lifelike imaging to the PC with its Targa board several years ago.

In 1987, AT&T began shipping the Vista Videographics adapter, which topped the resolution and speed of AT&T's former top-of-the-line board.

The Vista, a true 32-bit graphics processor, takes advantage of Texas Instruments' 34010 graphics co-processor. Consequently, it gives you a choice of several high-resolution color modes: you can have 16 million colors at a resolution of 1K by 1K dots, 32,000 colors at 2K by 1K dots, or 256 colors at a super-sharp 2K by 2K dots.

Contrast that with VGA's sharpest color mode (16 colors at 640 by 480 dots) and its



most colorful mode (256 colors at 320 by 200 dots), and you begin to feel that your supposedly state-of-the-art PS/2 display is a lot closer to a snowy black-and-white TV in a world where you can get a Sony Trinitron. And considering the costs, that's not a bad analogy: the Vista lists for a cool \$5,995, or what you'd pay for 10 or 11 VGA adapters.

But the Vista isn't just a vehicle for generating sharper 1-2-3 graphs. The Vista recognizes RGB analog, NTSC composite, and PAL composite signals, so transfers to and from video cameras are simple. Built-in pans and zooms move quickly, smoothly, and in full color. Four MB of dual-ported CMOS RAM is on-board for nearly seamless image swapping.

If you're disappointed by the graphics you see on PCs and PS/2s, get somebody to show you a Vista board in action. —Gus Venditto

FACT FILE: AT&T Vista Videographics Adapter; AT&T Telecommunications, 7351 Shadeland Station, #100, Indianapolis, IN 46256 (800) 858-TRUE; (317) 841-0332 **List Price:** \$5,995 **Requires:** IBM AT or 100% compatible. **Reviewed:** October 27, 1987, page 34.

CIRCLE 690 ON READER SERVICE CARD

AutoShade

It's already possible to represent objects as wireframe images on a screen display. But *AutoShade* takes CAD into the next frontier, bringing realistic imagery to the PC. Autodesk's \$500 program creates shaded color images from *AutoCAD* files while giving you extensive control over the viewing angle and the lighting of the objects.

Like the latest release of *AutoCAD*, *AutoShade* is operated by using pull-down menus and dialog boxes. An *AutoLISP* program that you run from within *AutoCAD* enables you to place special blocks—a "camera" and "light sources"—within your drawing. These blocks are then used by *AutoShade* to compute the desired scene.

You can have one camera and up to two light sources; the light sources can be directed, like spotlights, or can be points that emanate light in all directions. The positions of the camera and light sources can be modified easily, as can the aperture of the camera, to create various effects.

Once you've found the right spots for the camera and light sources, you create a "filmmoll" to be "developed" by *AutoShade*. But going further than the metaphor implies, you can develop scenes with different points of view and even modify the camera and light-source parameters within *AutoShade*.

A wireframe preview capability and a fast (and ugly) shading function give you a good idea of how the final scene will look before you invest the time to see it happen. The shading mode is sophisticated, and allows you to set

parameters such as light diffusion and specularly, which control the way light is distributed through the scene and the way reflective surfaces will appear. Thus one "filmmoll" can be used to make any number of "scenes."

AutoShade is not fast. The amount of number crunching that must be performed to shade even a fairly simple scene is substantial. First, the program must project the *AutoCAD* file into the space you define, based on the position of the camera. Then it has to define all the surfaces so that it will be able to determine what objects will show in the final scene. And finally, it must use the light sources and reflectivity parameters to calculate the appearance of each area in the scene. All of this takes time, but it's worth it.



A whimsical feature of *AutoShade* is called "Mandelbrot," after Benoit Mandelbrot, the Harvard professor of mathematics and IBM Fellow who developed the theory of fractals, which permits new levels of realism in object synthesis. An infinite variety of displays from a "Mandelbrot set," which are dazzlingly beautiful and endlessly fascinating can be created from within *AutoShade*. Some take hours to complete,



THE WORLD ACCORDING TO FELIX. Everybody has their own taste in pointing devices. Some people get around just fine on the cursor keys of a keyboard. **O**ther people like the feel of a mouse. Or a trackball because it stays put. Apostles of accuracy carry a torch for a tablet. Now comes Felix, which does in one square inch things a mouse, a trackball, or a tablet never dreamed of doing. **L**ets you intuitively race through 1-2-3, PageMaker, Ventura Publisher, AutoCAD, DOS and other programs. Lets you teach your fingers to think for themselves. **F**elix is built around a single moving part. **T**he one at the end of your wrist. **I**nvestigate this story at your local computer dealer. Or contact Lightgate, 6300 Telegraph Avenue, Oakland, CA 94609, 800-426-5324. **F**elix. Post-mouse input device. Think with your hands.

CIRCLE 221 ON READER SERVICE CARD

■ THE BEST OF 1987

but they are gorgeous.

AutoShade supports a number of graphics boards but needs an EGA or PGC to show its stuff. For hard copy, you can use PostScript laser printers and other output devices. As with *AutoCAD*, *AutoShade*'s file formats are described in a very readable manual.

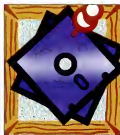
With such powerful features and a price of \$500, *AutoShade* brings new design capabilities within the reach of thousands of users who could not previously afford them. For that reason alone, it's one of the best of '87.—Joel N. Orr

FACT FILE: *AutoShade*; Autodesk Inc., 2320 Marinship Way, Sausalito, CA 94965 (415) 331-0356
List Price: \$500 **Requires:** *AutoCAD*, 640K RAM, math coprocessor, 1.2MB floppy disk, 20MB hard disk, DOS 2.0 or higher. Hercules graphics card, IBM PGC, EGA, or CGA; Orchid TurboGA; or Autodesk Device Interface (ABI); and either mouse, table, or joystick. Not copy protected. **Reviewed:** December 22, 1987, page 56.
CIRCLE 687 ON READER SERVICE CARD

Boyan

The most elegant and ingenious communications package you can buy is the work of a programmer who just entered college. Justin Boyan's program bears his name, perhaps to remind you to send him the \$35 shareware fee, perhaps because the author of any program this good deserves to be proud of it.

Boyan is packed with features that make you wonder why nobody else ever thought of them. You no longer have to type a filename twice when you want to download or upload it: *Boyan* finds the name you sent to the remote



computer and uses it for your computer (although you can simply type in another name instead). *Boyan* also incorporates a complete file manager that lets you choose a file for uploading by pointing to it on the menu. The program uses all available memory to record the entire current session; it also lets you redirect any part of this record to a file or to the printer.

Boyan's macro language, which lets you change passwords or long-distance codes without tedious retyping, is full of sensible and original shortcuts. A trace mode lets you debug script files. The dialing directory stores default transfer protocols for each system you call. If the protocol you like isn't included in the program, you can integrate it by adding an external module. You'll never again have to worry about the speed of the remote modem, because *Boyan* lets you dial at the highest available rate and switches automatically to whatever rate the remote system uses. Any number that's busy when you call is added automatically to the redialing queue.

Boyan is good for law offices or consultants because it keeps an optional log of every call. *Boyan* is good for electronic mail-users because its uploads are clean and fast.

Boyan is good for everyone because it saves time, effort, and keystrokes. It is even good for your spirit, because no communications program has a more elegant screen design. And it's good for your budget, too.

There's no host mode or terminal emulation in the program—yet—but every new release adds ingenious features. *Boyan* is the best of the shareware communications packages—which means, in effect, that it's the best communications package anywhere.

—Edward Mendelson

FACT FILE: *Boyan*, Version D3; Justin Boyan, 9458 Two Hills Ct., Columbia, MD 21045 (301) 495-7323 (BBS number). **List Price:** \$45 for disk and registration; \$35 registration fee for copies downloaded as shareware from a BBS. **Requires:** 192K RAM, DOS 2.0 or later. Not copy protected. **Reviewed:** October 27, 1987, page 43.
CIRCLE 688 ON READER SERVICE CARD

Compaq Deskpro 386/20

Working with computers means a life of constant adjustment. Software upgrades, new keyboards, new monitors, and new ways of printing the same work keep all of us paddling hard just to keep moving forward.

Sometimes the adjustments are easy to take. Working with Compaq's latest trendsetter, the Deskpro 386/20, is as difficult as

switching from hand tools to power tools: it may take a few minutes to adjust to the speed at which your tools are churning, but after 2 minutes, you don't ever want to go back.

When IBM introduced the PS/2 family last April, Compaq promised its followers that they wouldn't have to change to a Micro Channel architecture to wring ultimate performance out of today's DOS applications and tomorrow's OS/2 multitasking programs. That sounded like boasting, but it proved to be justified. We won't know about the next generation of applications until we have them, but Compaq has a strong lead in running 1987 software.

Unlike IBM's PS/2 design team, Compaq engineers didn't find it necessary to redesign the golden goose. All of the elements in the Deskpro 386/20 have been on the shelf and widely available, but some have been overlooked by the more timid PC designers.

Intel's 82385 cache-memory controller chip optimizes data transfers in the Deskpro 386/20 on what is essentially the standard AT bus. Because the 82385 can manage transfers to a large (32K) cache, memory reads occur with zero wait states at a 20-MHz clock cycle, on average, more than 90 percent of the time. To handle many expansion cards, the peripheral bus runs at 8 MHz, but the memory

Working with Compaq's latest trendsetter, the Deskpro 386/20, is as difficult as switching from hand tools to power tools.

**For the
Randolph Hearst
in all of us...**



TAXAN



controller keeps these data accesses running while the main processor accesses memory independently at 20 MHz.

The use of Weitek's floating-point coprocessor pushes the Deskpro 386/20's raw number-crunching speed close to the level of Sun and Apollo workstations. Few PC applications know how to use this high-performance CAD coprocessor at this writing, but Compaq reserved a memory location in its expanded memory manager software for accessing the chip, so applications using the coprocessor should soon appear. In the meantime, an 80387 can co-exist with the Weitek chip, so users don't need to sacrifice one for the other.

If you opt for one of the 130MB or 300MB hard disks, you'll get a shock-mounted disk and an ESDI (Enhanced Small Device Interface) controller with a 16K on-board cache. The result is disk accesses in the neighborhood of

25 milliseconds, a disk interleave of 1:1, and data transfer rates in the neighborhood of a cool megabyte per second.

And in harnessing this warehouse-size capacity, Compaq has refused to let an outdated DOS pull in the reigns. Compaq MS-DOS 3.31 is the first DOS that can recognize more than 32MB on a disk; the new limit is 512MB, which should be enough for this decade, at least.

Power doesn't come cheap, especially when it's a state-of-the-art design. But if you appreciate awe-inspiring power, you won't be able to keep your hands off this one. —Gus Venditto

FACT FILE: Compaq Deskpro 386/20; Compaq Computer Corp., 20555 FM 149, Houston, TX 77070 (713) 370-0670 **List Price:** Model 60, including 60MB hard disk, 1MB RAM, one 1.44MB floppy disk drive, \$7,499; Model 130MB, same as Model 60 with 130MB hard disk, \$9,499; Model 300, same with

300MB hard disk, \$12,499; DOS 3.31, \$120. **Reviewed:** November 10, 1987, page 36.

CIRCLE 685 ON READER SERVICE CARD

Compaq Portable 386

Laptops may have been the glamour machines of 1987, but for anything other than filling time while you travel, you've got to have something bigger.

The top choice for portable computing in 1988 is also 1987's biggest surprise: the Compaq Portable 386. Ranging in price from \$8,000 to \$10,000 and not much bigger than a six-pack, the Compaq portables are examples of truly remarkable engineering.

Putting an 80386 microprocessor into a portable was a smart move for Compaq. It took guts to push the 80386 to 20 MHz—25 percent faster than IBM's top-of-the-line personal computer—and to load the machine with hard-disk choices that, at the small size, are twice as capacious as the competition's and, at the large size, are bigger than the disks in 90 percent of all desktops.

The shock-mounted hard

disks can access data at better than 30 milliseconds—a faster rate than most ATs can offer. The 1MB of system RAM consists of 80-nanosecond 32-bit RAM chips and can be expanded up to 10MB right on the system board. There's even a way to plug a tape drive into the system for

Putting an 80386 microprocessor into a portable was a smart move for Compaq.

occasional backups.

The Compaq Portable 386 is clearly more than a machine for clearing up loose ends while you're away from the office—it's a portable office that may be better than the one you left. —Gus Venditto

FACT FILE: Compaq Portable 386; Compaq Computer Corp., 20555 FM 149, Houston, TX 77070 (713) 370-0670 **List Price:** Model 40, including 40MB hard disk, 1MB RAM, one 1.2MB floppy disk drive, \$7,999; Model 100, same as Model 40 with 100MB hard disk, \$9,999; DOS 3.31, \$120. **Reviewed:** November 10, 1987, page 109.

CIRCLE 684 ON READER SERVICE CARD





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CIRCLE 504 ON READER SERVICE CARD

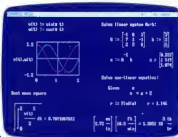
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If you've got one of the new IBM Enhanced 101-key keyboards, read no further. If you've got anyone else's keyboard—or an earlier IBM keyboard—and are interested in upgrading, keep reading. There are lots of cheap re-

with all the 101-key-standard key positions, but with the function keys arranged at the left in the original AT style, so those of us who mastered the two-finger sneak technique for Ctrl- and Shift- and Alt-plus-function-key commands can regain our sanity. . . .—**Jim Seymour**

FACT FILE: DataDesk International Turbo-101 Enhanced Keyboard; DataDesk International,



placement original-AT-style (84-key) and enhanced-AT-style (101-key) keyboards available these days, but there's only one DataDesk Turbo-101.

With a great typing touch, a new layout, and just the right amount of mass to avoid creeping around on your desk or falling off your lap, the DataDesk unit is the first alternative or replacement keyboard to challenge the IBM products seriously.

Now if only DataDesk International offered a version

7650 Haskell Ave., Van Nuys, CA 91406 (800) 826-5398, (800) 592-9602 (in Calif.), (818) 780-1673 List Price: \$149.95, including choice of Borland's *Turbo Lightning* or *Super-Key*. Reviewed: March 31, 1987, page 48.

CIRCLE 683 ON READER SERVICE CARD

FastCAD

In 1986, most of the excitement in CAD software was at the low end, thanks to *Generic CAD* and *Drafix*, both of which took mega-dollar CAD prices down to the mat. *Auto-*

CAD and *VersaCAD* are far from being counted out, since they offer the precision and features a serious designer needs but can't get for less than \$2,000.

In 1987, however, a challenger with the potential for really shaking things up emerged in the big league.

Evolution Computing's *FastCAD* is written entirely in assembly language for speed, and it shows. Put *FastCAD* next to *AutoCAD*, and the contest is over. You'd need expensive add-in coprocessor boards to give *AutoCAD* the kind of speed *FastCAD* burns off.

And there are plenty of features worth speeding to. An in-line text editor allows easy customization of menus, including creation of special features. Do lots of 50× zooms? Put that on the menu for a one-stroke move. Only do it on a certain kind of drawing? Customize your menu for that drawing.

When you zoom into one window, *FastCAD* will let you keep the rest of the screen active, so you can select objects from any of the current windows for use in another. You can open a window in the middle of a drawing command, select points from the main drawing, and connect them to points inside the window; changes made in the window are seen in the main drawing instantaneously.

FastCAD matches the floating-point precision of *AutoCAD* and *VersaCAD*, but it still has to catch up to the league leaders in a couple of features. Cross-hatching didn't come until *FastCAD*'s second release (1.1), and Evolution Computing is working on 3-D for a tentative 1988 release.

Is it worth leaving *AutoCAD* or *VersaCAD* to go with an upstart? If speed doesn't attract you, the interface might.

FastCAD's clear and responsive interface is neatly bordered by slim icons, no

**You'd need expensive
add-in coprocessor
boards to give *AutoCAD*
the kind of speed
FastCAD burns off.**

clutter. It uses point-and-shoot pull-down menus, like *Drafix*, but responds instantly. Colors are always available for selection; a strip of icons provides shortcuts to zooms, pans, and snaps.

The bottom line is that *FastCAD* puts no obstacles



between you and your design work. And I wish I could say that about other CAD packages.—**Gus Venditto**

FACT FILE: *FastCAD*, Version 1.10; Evolution Computing, 437 South 48th St., Tempe, AZ 85281 (602) 967-8633 List Price: \$2,295 Requires: 8087, 80287, or 80387 math coprocessor; CGA, EGA, or Hercules Graphics adapter and either digitizer or mouse. Not copy protected. Reviewed: August 1, 1987, page 48.

CIRCLE 687 ON READER SERVICE CARD

ForComment

We've gone a long way in empowering the single-PC user. The next breakthrough in PC productivity lies in making groups more powerful—in shared-work applications. Broderbund Software's *ForComment* (\$195) was the first generally available program for PCs in the "work-group software" category—a category it dominates, almost a year later, by virtue of its remaining the only entry in the field.

Group-written documents can show all the homogenized

FORCOMMENT:



shortcomings of group-processed *anything*. But the truth is that many business documents are the product of several reviewers' input into one principal author's draft. Previous methods of gathering that input involved tedious exchanges of typed or printed drafts, the loss of gems cut from early versions, and frustration over who said what about what they'd handle, and by when.

ForComment replaces that Keystone Kops approach to workgroup writing with a far simpler, faster, more secure round-robin of drafting and revision. It's best on a network, but still worth the trouble even for the LANless who'll have to pass disks

around. Smart, elegant, useful. —Jim Seymour

FACT FILE: *ForComment*, Broderbund Software Inc., 17 Paul Dr., San Rafael, CA 94903-2101 (415) 492-3200 List Price: \$195; 16-author networked version, \$995. Requires: 256K RAM, DOS 2.0 or later. Copy protected. Reviewed: March 31, 1987, page 277
CIRCLE 606 ON READER SERVICE CARD

Harvard Graphics

They dropped the "Presentation" from the title, added the slickest interface of any PC graphics program, and made the best even better. Software Publishing's *Harvard Graphics*—formerly *Harvard Presentation Graphics*—still tries hard to save us from ourselves when we try to build ugly charts, but now it also offers enough flexibility to let us modify, reshape, and annotate our charts to our hearts' content.

Business graphics programs for PCs ought to make it fast and easy to get from an idea or a crude graph (or just a row of column totals) in a *Lotus 1-2-3* spreadsheet to a finished, polished graphic image in just a few minutes. Otherwise, it's too easy to spend far more time than the graph is really worth trying to get something usable. *Harvard Graphics* isn't only fast by the usual measures of software speed—fast at loading, redrawing the screen, and dumping the results to a printer—it's also fast to use, including the industry's fastest, slickest method of snatching 1-2-3 data.

We've come a long way from the crude PC graphics programs of just 3 or 4 years ago. Other good choices, including *Freelance Plus*, *Win-*



downs Graph, and *35mm Express*, compete for other parts of the business-graphics pie. And the revitalized *Graphwriter II* may change how some companies use PC graphics software. But for those users mainly interested in turning out a few great-looking pie or bar charts for a meeting or presentation, and maybe a few "wordcharts" as well, it's hard to imagine a better product than *Harvard Graphics*. —Jim Seymour

FACT FILE: *Harvard Graphics*, Software Publishing Corp., 1901 Landings Dr., Mountain View, CA 94043 (415) 962-8910 List Price: \$395 Requires: 512K RAM, 640K RAM with VDI device; hard disk or two 3½-inch floppy drives; DOS 2.0 or later. Not copy protected. Reviewed: March 10, 1987, page 202
CIRCLE 605 ON READER SERVICE CARD

Hayes V-Series Smartmodem 2400 and Smartmodem 9600

The modem market seems to have entered a features race. Modems that transmit data at higher speeds and have built-in hardware error correction have been trickling into market for the past year or so, and now Hayes has entered the features race with its V-Series modems.

The flagship of the series

is the new V-Series Smartmodem 9600, a state-of-the-art 9,600-bit-per-second modem with Trellis encoding to improve performance on noisy lines, throughput well over 150 characters per second, and a competitive price. The 9600 is available both as a full-card internal modem for PCs and as an external modem in the now-familiar Hayes aluminum case.

All the V-Series products have adaptive data compression to improve throughput and LAP-B error correction so that data gets through even over the worst phone lines. The V-Series Smartmodems also speed up transmission by sending data across phone lines in synchronous mode, thus saving the overhead of having to send start and stop bits for each byte. The Modem Enhancer will even add



these features to your trusty external Smartmodem.

The only problem is that you need V-Series modems at both ends of the line to take advantage of their special features. They are strongly recommended if you have point-to-point communications needs.

Even though Hayes' marketing muscle alone could have gone a long way to ensure that its new modems would take a leading position among high-speed PC communications products, the



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company has indeed produced a line of technically superior modems.

—Howard Marks

FACT FILE: Hayes V-Series Smartmodem 2400 and Smartmodem 9600, Hayes Microcomputer Products Inc., 705 Westech Dr., Norcross, GA 30092 (404) 441-1617. List Price: V-Series Smartmodem 9600 (external unit), \$1,299; Smartmodem III recommended (\$249). V-Series Smartmodem 9600B (on a plug-in board), bundled with Smartcom III, \$1,299; hardware only, \$1,119. V-Series Smartmodem 2400 (external), \$899. V-Series Smartmodem 2400B, bundled with Smartcom III, \$899; hardware only, \$849. V-Series Modem Enhancer, \$349. Reviewed: October 13, 1987, page 33.

CIRCLE 684 ON READER SERVICE CARD

Hot Line and Hot Line II

Hot Line, a \$39.95 pop-up phone dialer, arrived to collective yawns. Everybody who wanted a TSR phone dialer already had one in the form of SideKick or another desktop accessory. In the words of NYNEX's ad campaign for its Yellow Pages: "Why would anybody want another?"



As it turned out, there were plenty of reasons. Hot Line became so popular in certain circles that at least two other PC Magazine editors nominated it for Best of the Year.

Hot Line boasts a fine drop-down menu user interface, a surprisingly useful di-

Hot Line's edge is its flexibility. You can reassign or even deassign a whole raft of hotkeys for various functions.

rectory of 5,000 phone numbers, an extensive area code directory accessible by code or place name, and lots of telephonic smarts. Hot Line lets you pick numbers off the screen, use the keypad as a dialer, assign three sets of "speed dial" numbers to the function keys, and quickly access its national directory or your own.

Hot Line's edge is its flexibility. You can reassign or even deassign a whole raft of hotkeys for various functions. You can make it automatically link long-distance numbers with their long-distance-service prefixes, complete with the requisite pause. You can let it know which local prefixes require special handling. You can even have it log your calls—all or just the long-distance ones.

Hot Line II (\$75), seen at deadline in a beta version, should be available by the time you read this. It allows you to use up to four different long-distance services, update and search directories more easily, and import and export directories in dBASE III and other standard file formats.

Hotline II also includes an "attack redialer" to smash through stubborn busy signals. The log function now lets you time your calls. Centrex system, network (includ-

ing directory-sharing), and VGA support have been added. If you've got 1.2MB of hard disk storage to spare, you can use a new 10,000-entry national directory that includes addresses. Best of all, if it sees 85K or so of expanded memory, the new version will politely take up residence there and occupy less than 3K of DOS's South 640. Nice.

—Stephen Manes

FACT FILE: Hot Line and Hot Line II; General Information Inc., 401 Parkplace, Kirkland, WA 98033. (206) 828-4777. List Price: Hot Line, \$39.95; Hot Line II, \$75.00. Requires: Hot Line, 47 to 55K RAM, DOS 2.0 or later. Hot Line II: 72 to 84K RAM or 38K RAM plus 82K of expanded memory. DOS 2.0 or later. Reviewed: June 23, 1987, page 281.

CIRCLE 675 ON READER SERVICE CARD

HP LaserJet Series II

And you thought your regular Hewlett-Packard LaserJet was hot stuff.

The original HP LaserJet and its smarter brother, the

LaserJet Plus, turned the printer market upside down at their introduction, bearing more features for less money than anyone had expected. And just when they were starting to look old-fashioned and expensive, along came the new LaserJet Series II, 1987's version of The Spoiler—for other laser printer manufacturers, that is.

At a list price of \$2,595 (but typically sold on the street at \$1,795 or so), the HP LaserJet Series II printer uses Canon's new SX laser engine, allowing a lower profile, longer cartridge and printer life, and better blacks on the printed page.

The LaserJet Series II still comes with too little memory (512K), but this can be boosted to 1.5MB, 2.5MB, and 4.5MB with add-in cards. Third-party vendors can add value through products for the LaserJet Series II's expansion slot, too, such as printer-sharing cards. HP also added a second font-cartridge slot; a dim, hard-to-read 16-charac-



XyWrite III Plus: For People Who Write



People who write a lot have always depended on XyWrite to get the job done. Datapro Research Corporation said XyWrite III was "...the fastest word processor...its power and flexibility are unmatched." Now XyWrite III Plus introduces authoring tools that will make you even more productive than before.

XyWrite III Plus has the flexibility to handle all of your writing needs, from simple letters and memos to special applications such as audio-visual scripts with multiple independent columns, or complex research papers which require one-key switching between notes, outlines and drafts - up to nine different files in nine "windows."

The on-line *Spelling Checker* sports a 100,000-word dictionary to help prevent embarrassing, and costly, typos. Check your spelling as you work. Or, if you'd prefer not to break your train of thought, wait and check the entire



document when you've finished writing it. You can even check multiple files with a single command. A unique shorthand feature saves valuable time by expanding predefined abbreviations; "asap" becomes "as soon as possible" instantaneously! And the renowned 220,000-word *Microlytics' WordFinder® Thesaurus* enhances creativity, putting alternative words at your fingertips.

Use the *Redlining* feature to edit another writer's document. Mark suggested changes to the text but leave the original material intact. Combine *Redlining* with *Hidden Notes* and you have an ideal way to share thoughts with the original author.

XyWrite III Plus provides unmatched laser printer support (including PostScript) for desktop publishing. Whether you're using cartridge or downloadable fonts, or mixing different point sizes on a line, XyWrite III Plus will automatically hyphenate and justify...as you type. A host of vertical spacing commands give you maximum control over vertical movement as well. And XyWrite III Plus lets you *Include* ready-to-print files from other sources, eliminating the need to cut and paste.

The superior output capabilities of XyWrite III Plus, combined with an established reputation for speed and flexibility, clearly indicate that there is only one choice for word processing software. If you write, you need XyWrite III Plus. For more information and the name of a dealer near you, call or write today.

PostScript is a registered trademark of Adobe Systems, Inc.

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"There is no question—the HeadStart is an excellent value"

*InfoWorld, September 14, 1987 Page 66 TQ

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Heavyweight Wrestler

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CIRCLE 731 ON READER SERVICE CARD

■ BEST OF 1987

ter front-panel LCD; easy front-loading of single, hand-fed sheets; and auto-collating of multiple-page printouts.

Like its predecessors, the LaserJet Series II supports the HP command set. With six resident fonts (10-pitch Courier, 10-pitch Courier Bold, and 16.6-pitch Lineprinter, all in portrait and landscape), the Series II comes up a bit short in the font category compared with some other laser printers, but it does accept HP's raft of downloadable fonts.

It's still the pick of the litter among non-PostScript laser printers. The LaserJet Series II secures HP's grip on the market through another generation of desktop laser printers. —**Jim Seymour**

FACT FILE: HP LaserJet Series II; Hewlett-Packard Co., 1820 Embarcadero Rd., Palo Alto, CA 94303 (800) 752-0900 **List Price:** \$2,595 with 512K RAM. **Optional 1MB RAM,** \$495; **optional 2MB RAM,** \$995; **optional 4MB RAM,** \$1,995. **Reviewed:** April 28, 1987, page 132. **CIRCLE 674 ON READER SERVICE CARD**

HP PaintJet

None of the Hewlett-Packard PaintJet's features is spectacular in itself. The predefined selection of 330 colors grabs your attention, but other color ink jet printers can manage the same. The NLQ text is dark and adequately formed, but you don't get much in the way of text-enhancement or page-formatting features. The \$1,395 list price is lower than that of many other printers, but you can pick up a low-end color ink jet for less.

So what's all the to-do about the HP PaintJet? Finally, someone has built a color



graphics printer powerful enough to transform brilliant screen displays into brilliant hard copy, versatile enough to function adequately as a text printer, and compact enough to sit unobtrusively atop a desk—all for a price that's reasonable, if not cheap.

Don't forget the prestigious signature stamped on the chassis, either. The Hewlett-Packard name means software vendors will gladly develop PaintJet drivers, so you won't be left holding a printer that nobody supports.

Rated at 167 characters per second by Hewlett-Packard, the PaintJet holds its own against most dot matrix printers in speed, and its ink jet technology makes it mercifully quiet. And, speaking of ink jet technology, Hewlett-Packard built a couple of nice features into the PaintJet that keep the ink on the paper and not on your hands.

The HP PaintJet certainly isn't for everyone. If printing high-quality text is more important to you than cranking out multicolor graphics, then

you're better off with a laser printer. But if you often find yourself in need of color graphics for reports, presentations, or just good clean fun, the HP PaintJet offers the best deal. —**Mitt Jones**

FACT FILE: HP PaintJet; Hewlett-Packard Co., 1820 Embarcadero Rd., Palo Alto, CA 94303 Call nearest HP sales office (800) 752-0900 **List Price:** \$1,395 **Reviewed:** November 10, 1987, page 297. **CIRCLE 673 ON READER SERVICE CARD**

IBM Micro Channel Architecture

What can you say about any development that stands the industry on its ear, divides loyalties, and turns brother against brother? It's the computer-industry equivalent of the War Between the States.

Micro Channel architecture is an elegant, intelligent, multiprocessor-capable, fast, IBM-engineered solution to a problem that some quarters say we don't even have. It hasn't made a darned bit of difference in IBM's market share, or Compaq's, or any-

one else's, for that matter. What it's given IBM is product differentiation in a marketplace where the machines were becoming increasingly commodity-like. It's also posed the challenge to other companies to maximize the performance of the existing PC AT architecture.

And they've done a fine job. Compaq and others are doing things that IBM wouldn't (or couldn't) do. We're all better off for the existence of PS/2, the confusion it's generated, and the better products forged through competition and strife. The creation of any new bus design is a feat of engineering and perseverance. Micro Channel architecture is no exception.

—**Bill Machrone**

IBM PS/2 Model 50

So you've gotten past the issue of whether to buy an IBM PS/2 or not, and you've decided to pledge your troth to the Micro Channel bus. Which machine do you buy?

Not the PS/2 Model 30, which is really a PC-XT in drag. Not the Model 60, which is a Model 50 in drag, at a \$1,700 premium for a few more slots and a faster hard disk. And as much as you like the Model 80, you'd rather buy that house in Malibu, priced about the same as the 80.

Ahem. The Model 50 beckons. It's relatively small, relatively fast, and thoroughly PS/2. So what if it has the slowest hard disk you've seen in years. So what if it has only three expansion slots? It's affordable, and if you've succumbed to the PS/2 mystique, it's the value-point in IBM's new line.

The more you grow, the



more memory you need.



When the concept of personal computers was conceived, people didn't think about

memory. And for good reason. You didn't need a lot of it.

But as the PC matured, so did its workload. Applications and spreadsheets continued to grow, and software became more advanced.

Now memory seems to be on a lot of people's minds. In response, we introduce a powerful new generation of add-on memory boards.



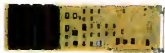
IDEAmc/MC (left) and Supermax/MC (right), for the IBM PS/2 Models 50 and 60.

Boards that readily supply a great amount of memory for today's most intensive applications, and tomorrow's most demanding tasks.

Two boards, IDEAmc/MC for the IBM PS/2 Models 50 and 60, and Supermax/EMS for the AT and XT 286, deliver a staggering 12MB and 16MB of memory, respectively. So when OS/2 debuts, you'll be prepared with ample memory to support its multitasking environment.

As the result of an advanced manufacturing technique called Surface Mount Technology, each of our boards occupies a single slot (you'd

need as many as five boards to get the same features from the competition). And each board supports the Lotus/Intel/Microsoft* specification. Meaning you



IDEAmc 30 (top) and Supermax 30 (bottom), for the IBM PS/2 Model 30, PC and XT.

can create the largest spreadsheets and use integrated software packages. Per your speci-

cation, our boards can be built with either 256K chips or 1MB chips.

Supermax/MC is for the IBM PS/2 Model 50 and 60.

It features 8MB of memory, one serial port and one parallel

port. IDEAmc 30 gives you 8MB of memory. While Supermax 30 combines the same memory plus two serial ports and one parallel



Supermax/EMS, a full 16MB of RAM for the AT and XT 286.

port. Both are for the PS/2 Model 30, the PC and XT.

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CIRCLE 265 ON READER SERVICE CARD



Hmmm: three slots. One for a network card, one for a memory card so you can run OS/2, one for an IRMA card to call up the mainframe. And a modem card? Hard disk tape-back interface card? Oops. But remember: you got to play the PS/2 game for only twice what a faster AT clone would have cost. One with *eight* slots.

Hmmm. Tell me about the Micro Channel again, Uncle Bill.—**Jim Seymour**

FACT FILE: IBM PS/2 Model 50; IBM Corp., Consult your local authorized IBM dealer, (800) 447-4700
List Price: \$3,595 **Requires:** DOS 3.3, VGA monitor. **Reviewed:** July 21, 1987, page 122.
CIRCLE 643 ON READER SERVICE CARD

The IBM VGA Standard

VGA may not be the best video around (look to the AT&T Vista Videographics Adapter for that), but its importance

VGA is another stamp of approval by IBM on the continued move into graphics that is occurring throughout the industry.

and value should not be underestimated.

IBM's Video Graphics Array (VGA) breaks from current PC video by pairing analog signals with high resolution. The result: an affordable way to offer huge palettes of colors at reasonable resolutions. Previously such effects could be achieved through IBM's own overpriced and undersupported Professional Graphics Controller, or through non-Blue answers such as the AT&T Targa or Apple Macintosh II.

VGA is IBM's acknowledgment that resplendent arrays of color have valid uses in the business and personal computer markets.

VGA is split into five levels, if you include MCGA (Multi-Color Graphics Array), which is standard on the Personal System/2 Models 25 and 30. Basic VGA consists of 640 by 480 resolution, with 16 colors on-screen out of a palette of 262,144. Optional enhancements take you in steps to the top of the line: 1,024 by 768 resolution, with 256 colors on-screen out of a palette of 262,144—a \$3,110 option package, if you include the higher-resolution IBM 8514 monitor that's needed).

This structured arrangement of standard and optional features is typical of IBM. Before long, however, expect to see many third-party add-in boards and monitors that will take the standard to its limits. A similar situation occurred in 1985, when IBM released the EGA standard, which became a platform for third-party hardware and software vendors to build on. Within a year, there were half-length boards with the full 256K of video memory that took resolution to 640 by 480 (the base level of VGA) for half the cost of the overpriced and underloaded IBM board.

With VGA, IBM has raised the stakes in PC graphics, and we can only benefit from it. Seeing the combination of color, graphics, and clear text as a luxury may finally be a thing of the past. VGA is another stamp of approval by IBM on the continued move into graphics that is occurring throughout the industry. Since it is difficult to

build a solid base of users without a standard, VGA is welcome here.

—**Philip F. H. Rose**

Informix Datasheet Add-In

At first, the *Informix Datasheet Add-In* may look like the ultimate ridiculous extension of a perfectly good idea: turning *Lotus 1-2-3* into a front end for an SQL-query database. Use it a while and you'll change your mind.

Although *Lotus 1-2-3* is hardly a serious DBMS product, an awful lot of 1-2-3 users consider it a database program: just look at the market research on PC users' answers when asked which DBMS they use. It's certainly fine for list making; indeed, the rows-and-columns approach forces users into a table view, as opposed to a forms view, of their data, which is probably a



good idea for DBMS beginners. But the feeble *Data* features of *Lotus 1-2-3* defy attempts to retrieve and manipulate these stored data—the essence of powerful use of databases—for any but the simplest uses.

Datasheet is like a tunnel through *Lotus 1-2-3*: it uses 1-2-3 as a front end for data entry into a completely separate database stored by *Datasheet*. Indeed, *Datasheet* data

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When it comes to compatibility, LIPS 10 PLUS printers are one-for-one with Hewlett-Packard's LaserJet Plus as well as Diablo daisy wheel and Epson dot matrix printers.

You get some important extras for your good looks too. For that professional publishing look, there's the built-in LIPS Command Language and CIEFLEX fonts that give you simplified forms generation, special characters, fonts and high-resolution bar codes. Versatile LIPS font cartridges are HP-compatible for extra variety in the fonts you select. On top of it all is a smart English-language front panel that changes compatibility and print attributes in a snap.

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■ BEST OF 1987

cannot subsequently be accessed through *1-2-3's* Data Query and Data Extract commands: you'll have to go back through the *Datasheet* tunnel to get at them.

In return, *Datasheet* brings far more functionality to that database. And it allows you to get at your data through worksheets other

***Datasheet* may be just the answer for those users who need to stretch 1-2-3 to match their own fast-growing needs.**

than the one through which you built the database, even letting you access the data through other applications that employ Structured Query Language (SQL) conventions.

When accessing a database through a worksheet and *Datasheet*, you'll find a world of possibilities you may have wanted but never got from Lotus. My favorite is the ability to group and manipulate related rows as subsets of the extracted datasets.

Learning how to use *Datasheet* is not a trivial job; even if you already use the Data parts of *Lotus 1-2-3*, expect to spend several hours getting the *Datasheet* commands down pat. But in return, *Datasheet* gives you a world of functions beyond *1-2-3's* capabilities. *Datasheet* may be just the answer for those users who need to stretch *1-2-3* to match their own fast-growing needs.

—Jim Seymour

FACT FILE: *Informix Datasheet Add-In*; Informix Software Inc., 4100 Bohannon Dr., Menlo Park, CA 94025 (415) 322-4100 List Price: \$199.95 Requires: 640K RAM; 1MB hard disk drive; 1-2-3, Release 2.0 or later; DOS 2.11 or later. Not copy protected. Reviewed: October 27, 1987, page 38. CIRCLE 660 ON READER SERVICE CARD

Kurzweil Discover 7320

You can't really appreciate the Kurzweil Discover 7320 until you've actually seen it in action.

Imagine that a page cut from a magazine, covered with typeset print of all sizes, is pulled inside a box about the size of a printer. The paper moves slowly, and for a few moments nothing seems to be happening. Then words begin to appear on the PC screen. A line, then two, then three, and, quickly now, words flood the screen even after the paper has passed through the Discover's plastic case.

As miracles go, this is a relatively minor event. Large seeing-eye machines have been reading for just over 10

years now. But their prices have relegated them to obscurity.

Kurzweil's Discover 7320 brings reading intelligence into the PC ballpark. At \$9,950, it delivers almost as much as the big guns for less than half the cost of its nearest competitor.

The scanner is attached to a PC expansion card. A Motorola 63020 is the brains of this operation; 2MB of on-board RAM hold the system's software and buffer data, so it only costs you 16K of operating RAM. The unit can read in the background and will switch into a graphics mode, so you have the makings of a real desktop publishing switch-hitter.

The Discover isn't perfect. It has the potential to read all standard typefaces (except script and other decorative fonts) from 8 to 24 points, but it makes errors in the range of 15 out of 600 characters when it's learning a new font. Once the machine has been running through a document of a single typeface in one session, the errors drop down to acceptably low rates.

The manufacturer recommends you feed it a page at the beginning of a session to warm it up.

At this price, the Discover 7320 is no threat to professional typists. You can stack pages up to three-quarters of an inch high, but it demands regular attention. The unit reads only a column at a time, so you may have to do extensive cut-and-paste work. It works best when you guide it away from graphics elements, and its work always needs proofreading.

But as for miracles—it sure comes close.

—Gus Venditto

FACT FILE: *Kurzweil Discover 7320*; Kurzweil Computer Products, 85 Albany St., Cambridge, MA 02139 (800) 843-8031, (617) 864-4700 List Price: \$9,950 Requires: 640K RAM; hard disk drive DOS 3.0 or later. Reviewed: October 13, 1987, page 270. CIRCLE 661 ON READER SERVICE CARD

Lap-Link

If you haven't yet had to transfer files between computers with different-size disk drives, don't worry, you will—either between a desktop system and a laptop or between a PC/XT/AT system and a PS/2. When the time comes, you are well advised to have Traveling Software's *Lap-Link* handy.

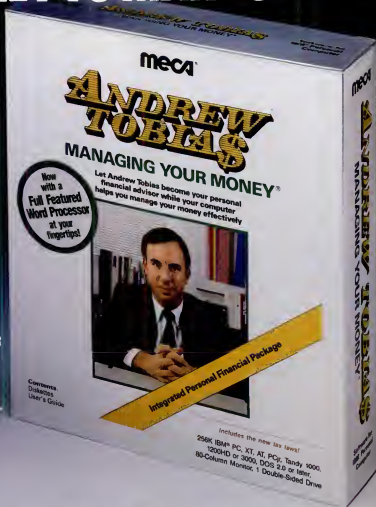
The *Lap-Link* package comes with a 5¼-inch disk, a 3½-inch disk, and a 6-foot cable for connecting two computers. The cable is notable for having both a 9-pin connector and a 25-pin connector at each end. This duo lets you connect any combination of MS-DOS computers, whether they use a 25-pin connector on the serial port



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PC Magazine, 1987

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CIRCLE 132 ON READER SERVICE CARD



We're Making A Small Case For The Hard Disk.

The industry said it couldn't be done. You can't put a hard disk in a portable PC, make it powerful, and keep it under 11 lbs.

Well, with that challenge in mind, we immediately went to work to prove them wrong. Presenting the results. The new T1200.

With a footprint of only one square foot, it comes with a 20MB hard disk, one 720KB 3½" diskette drive, 1MB of RAM, MS-DOS® 3.2, and Borland Sidekick™ software. So you get desktop PC features, with the performance of a powerful PC-compatible 80C86 processor, running at 9.54 MHz.

But that's not all. Take a look around back. There you'll find

more ports than the California coastline. One for everything including parallel, serial, RGB and monochrome monitors, 5¼" floppy disk drive and numeric keypad.

The T1200 is easy to face, too. With its new super-twist LCD screen and a full-size keyboard. But better still, thanks to its removable, rechargeable battery, you can keep computing wherever you go.

Just call 1-800-457-7777 for your nearest Toshiba dealer and ask him to show you the new T1200.

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The T1200 is backed by the Exceptional Care program. One year warranty required. See your dealer for details. MS-DOS is a registered trademark of Microsoft Corporation. Sidekick is a trademark of Borland International, Inc.





(as do the PC, XT, and PS/2 Model 80) or a 9-pin connector (as do the Toshiba laptops and the PC AT).

Although it is not the only specialized file-transfer program available, *Lap-Link* is by far the easiest to use. To establish communications, you only have to plug the cable into the serial ports on each system, load the program on each, and set *Lap-Link* for the proper communication ports. Once the computers are talking, you can raise the speed to the maximum that the systems can handle, up to 115,000 bits per second.

The *Lap-Link* command structure is intuitively obvious, making it extremely simple to learn and use. The program comes up on both computers, showing the directories of both currently logged drives. Whichever computer you're sitting in front of is the "local" system and has its files listed on the left side of the screen. The other system is the "remote," and its files are listed on the right. Across the bot-

tom of the screen is a Lotus-like menu.

To transfer files, you point to the file you want to transfer and pick the copy command. Alternatively, you can enter a wildcard copy command (*.doc), or you can tag unrelated files and transfer all tagged files. A full range of options lets you send only those files that differ from those on the target disk, only those files showing a specific range of dates, or all subdirectories below the currently logged directory. This last feature is particularly useful if you are upgrading to a new system and want to transfer everything from your old hard disk to a new one.

Also worth mention is *Lap-Link*'s speed. Transferring a 100K file from a PC AT hard disk to a laptop floppy disk takes less than 20 seconds. I usually spend more time plugging in the cable than actually transferring files.

If you like a package that's fast, efficient, and easy to use, *Lap-Link* is clearly the local-

file-transfer program of choice.

—M. David Stone

FACT FILE: *Lap-Link*, Version 2.05: Traveling Software Inc., North Creek Corporate Ctr., 19310 North Creek Pkwy., Bothell, WA 98011 (800) 343-8080, (206) 483-8088 in Wash. List Price: \$129.95. **Re-**quires: 192K RAM, serial port in each computer, DOS 2.0 or later. Not copy protected. **Reviewed:** July 21, 1987, page 406.
CIRCLE 646 ON READER SERVICE CARD

List

Install 500 programs on your hard disk, and you won't use any of them more often than you use *List*. The software equivalent of a Swiss Army knife, Vernon D. Buerg's shareware masterpiece lets you view files in every conceivable way.

Although *List* may not have the retractable parts of a Swiss Army knife, it does have a similar kind of versatility. Type LIST and the filename and you see the insides of any file you like, whether text or program. You can queue forwards and backwards through whole series of files, mask annoying garbage characters, search for text, or

List's other functions, many of them enhanced in this year's version. You can print part or all of a file, or redirect marked sections to a new file. You can display a ruler, scroll in any direction, toggle word wrap, make files more readable by using different filters, switch to the 43-line mode of EGA, and change screen colors. When you've chosen a default setup that you like, you can "clone" a copy of *List* that will then start up with your new settings as the defaults. You can even choose whether to exit *List* with its last screen still on display or have *List* clear the screen when you exit. All this, complete with on-line help, fills 8K on your disk.

There's nothing like *List*. If you aren't using it ten times a day, you obviously don't own a copy. Call your favorite BBS and download it today. —Edward Mendelson

FACT FILE: *List*, Version 6.2a; Vernon D. Buerg, 456 Lakeshire Dr., Daly City, CA 94015 (415) 994-2944 (BBS) List Price: \$15 (shareware). **Requires:** 66K RAM. Not copy protected. **Reviewed:** June 23, 1987, page 286.
CIRCLE 648 ON READER SERVICE CARD



display two files, or two parts of the same file, at the same time.

The Swiss Army knife in your pocket will need lots of peripherals to keep up with

Lotus Express

What could be more convenient than sending and receiving messages by MCI Mail? Sending and receiving them with *Lotus Express*. Any number of communications programs will let you create a script that can sign on to MCI Mail, send your outgoing messages, ask for incoming messages, and save them to disk. But *Lotus Express* is designed specifically for that task. It can do all this right out of the box, without your hav-

Lotus Express
© International Business Machines Corp.



ing to teach it how.

If that doesn't impress you, *Lotus Express* has a few more tricks up its sleeve—most of which you can't duplicate with any standard communications program. To begin with, *Lotus Express* operates in the background, so you can use your computer for other tasks while it handles the mail. Load it with your AUTOEXEC.BAT file, and you'll never have to think about calling MCI Mail. The program will check for incoming mail periodically through the day. If it finds a message, it will beep at you through your PC speaker.

Lotus Express will also maintain your incoming and outgoing mail. Call up the program with the hotkey, and it will show a list of incoming messages with any unread messages marked. It will notify you of any messages that couldn't be sent, along with a note explaining the problem. Messages that have been sent successfully are kept in a separate list, where you can delete them as necessary to make room on your disk.

Best of all, *Lotus Express* establishes an error-correcting link with MCI Mail. If you're plagued by noisy phone lines, you no longer have to worry about line hits. Every message goes through without errors—the first time. And if you're sending

mail to another *Lotus Express* user, you can actually send binary files: spreadsheets, formatted word processing documents, even .EXE and .COM files.

Granted, *Lotus Express* is not an all-purpose communications program. But for MCI Mail users, *Lotus Express* is a must.—M. David Stone

FACT FILE: *Lotus Express*, Version 1; Lotus Development Corp., 55 Cambridge Pkwy., Cambridge, MA 02142, (617) 577-8500 or MCI Mail: 2000 MNW, #100, Washington, DC 20036 (800) 444-MAIL. List Price: \$100, including one-year MCI Mail subscription, plus transmission charges. Requires: 256K for DOS 2.0 or 2.1; 320K for DOS 3.0 or later. Hayes-compatible modem. Not copy protected. Reviewed: May 12, 1987, page 308. CIRCLE 648 ON READER SERVICE CARD

Lotus/Intel/Microsoft Expanded Memory Specification (LIM 4.0)

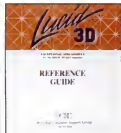
The best thing about LIM 4.0 isn't the way it can manage multiple tasks—nor its ability to run programs from expanded memory, nor even its 32MB capacity. The best thing is that it extends the life of DOS well into the next decade.

DOS was headed nowhere fast until LIM came along. But the original spec was blatantly one-dimensional and inflexible. It grew some along the way, primarily at AST's urging. Now it gives you some real power and flexibility, with no practical limit to the size and number of TSRs, RAMdisks, or big programs. Sure, OS/2 has its place, but here we're talking about application programs we haven't even been promised yet. Adapting an existing

program to LIM 4.0 is a drop in the bucket compared with rewriting it for OS/2. And OS/2 is devoid of the "global" services that TSRs can provide in DOS.

LIM 4.0's ability to swap into the base 640K of memory opens up new possibilities in program design. Overlays don't become a thing of the past; they ascend to a thing of the fast. Swapping code in from EMS memory is faster than a RAMdisk, and the support is right there in the driver.

But there's LIM 4.0 and there's LIM 4.0. The new spec takes advantage of hardware registers on the memory board, if they're present. The



buffs, a kind of Quattroporte for power users who've become jaded by 1-2-3, then PCSG's *Lucid 3D* is the Z-car of the new crop of spreadsheets: fast, powerful, and affordable—a new idea, not just a better expression of an old one.

Lucid 3D is the Z-car of the new crop of spreadsheets. A memory-resident pop-up, it makes the most of the 75K of RAM it occupies.

It's fast and intelligent and slick about linking multiple spreadsheets.

spec runs on old boards, but with greatly decreased performance. Also, it's up to each manufacturer to write its own drivers for its memory cards. There can be considerable differences in quality and degree of compliance with the spec. It'll probably take the better part of 1988 for all the pieces to sort themselves out. So, as much as LIM 4.0 will be doing for you in the coming years, keep a sharp eye on the numbers.

—Bill Machrone

Lucid 3D

If Microsoft *Excel* is the hot new spreadsheet of the year for big-time row-and-column

A memory-resident pop-up, *Lucid 3D* makes the most of the 75K of RAM it occupies. It's fast and intelligent and slick about linking multiple spreadsheets. It even has a screen-capture feature that can snatch a block of lifeless numbers from a screen in your word-processing program, then slap those numbers into *Lucid* cells, where they come to life, allowing all the usual spreadsheet manipulations and calculations.

As nifty as it is, *Lucid 3D* isn't necessarily (to adapt a line from the late-night UHF TV stations' ads) "all the spreadsheet you'll ever need." There are limits to what you can do in the 59K of spreadsheet space offered by

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CIRCLE 338 ON READER SERVICE CARD

■ BEST OF 1987

Lucid 3D—although fewer limits than you might think, if you get in the habit of linking several smaller worksheets, rather than building single worksheets that approach or exceed *Lucid's* 254-column by 9,999-row limits.

—Jim Seymour

FACT FILE: *Lucid 3D*; PCSG, 11035 Harry Hines Blvd., #206, Dallas, TX 75229 (214) 351-0564. List Price: \$199. Requires: 128K RAM, DOS 3.0 or later. Not copy protected. Reviewed: October 27, 1987, page 52.

CIRCLE 692 ON READER SERVICE CARD

Mace Utilities

Short of continuous and total backups, nothing lets you recover data from more different kinds of disasters than the *Mace Utilities* from Paul Mace Software. If *Mace* is installed on your disk and some misbehaved program scrambles your directory, simply tell *Mace* that you just formatted your disk by accident, and you'll get back everything intact. If you've erased a file that happened to be scattered into a dozen fragments on your hard disk, *Mace* (and only *Mace*), lets you recover the whole file automatically with absolute confidence that you'll get it back whole. Even if you never installed *Mace* on your disk, it can still do what no other program can—recover your subdirectories and files after an accidental format or damage to your root directory or file allocation table.

Earlier versions of *Mace* already had unique powers of data recovery, but the new version goes further. Although *The Norton Utilities* is simpler to use for multiple undeletes or for manual recon-



struction of files, *Mace* makes it unnecessary to attempt manual reconstruction at all. And *Mace* now includes a utility to restore mangled *dBASE* files.

Mace throws in hot-rod utilities that unfragment files and sort and squeeze directories. The package also includes a disk cache, utilities to speed screen writing and cursor movement, and even a utility to fix the incompatibility of DOS 3.3 with some third-party hard disks. The new manual is lucid and complete. Nothing defends your data more zealously than *Mace*.—Edward Mendelson

FACT FILE: *Mace Utilities*, Version 4.1; Paul Mace Software, 400 Williamson Way, Ashland, OR 97520 (800) 523-0258, (503) 488-0224. List Price: \$99; upgrade from earlier version, \$25. Requires: 256K RAM. Not copy protected. Reviewed: June 23, 1987, page 281.

CIRCLE 645 ON READER SERVICE CARD

Manuscript

It takes an exceptionally good word processor to jolt a jaded software reviewer from the doldrums of the Yet Another Word Processor Syndrome. *Manuscript*, from Lotus De-

velopment Corp., is such a package. It is the Great Write Hope for anyone who creates large documents. *Manuscript's* tools help you fight the battle for fine document production on three fronts: You can write well, organize well, and format well simultaneously.

I was duly impressed by *Manuscript* when I first reviewed the package for *PC Magazine*, but it wasn't until I used the program to create and manage my own 500-page manuscript (including table of contents, index, cross-referenced tables, and most of my graphic information) that I recognized its true power. Not only could I keep my blossoming document under control during the creation, but the final output looked terrific!

The secret of *Manuscript's* power lies primarily in its unique Structured Edit mode. During a structured edit, a powerful built-in outliner allows you to create and view your document in various states of collapse and expansion. You can also make design decisions concerning how the various levels of your document will appear in print. For instance, if you want all level-one headings (such as "Chapter N") to have a certain typeface, point size, position on the page, spacing, and tag, you simply fill out a sheet expressing your desires. A print formatter lets you view the final output on screen, including tables, equations, and illustrations.

Documents are typically more than just words on paper. So, the software lets you instantaneously incorporate graphics (from *Freelance Plus*, *Lotus 1-2-3*, or scanners) and spreadsheets in

your document. An imported spreadsheet is whipped into a nifty-looking table in a matter of moments using *Manuscript's* table-making facilities. Or you can construct a table free-form from within *Manuscript*. Support materials, such as cross-references, tables of contents, footnotes, and indexes, are generated and maintained without your having to leave your main document.

For the science crowd, *Manuscript's* built-in equation language uses an expedient and intuitive English-language-type syntax. There's a built-in spelling checker and a



facility to create custom dictionaries. There's even a Compare feature that allows you to track revisions during the life cycle of a document. In case you don't need a particular feature, the program has a modular architecture so that you're not burdened.

My magic ball predicts that the engineering and scientific communities will be the first to embrace *Manuscript*. But when the secretary or technical writer gets a look at *Manuscript's* output and asks incredulously "How did you manage that?" the cat will be out of the bag.

—Robin Raskin

FACT FILE: *Manuscript*, Version 1.0; Lotus Development Corp., 55



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Cambridge Plwy., Cambridge, MA 02142 (617) 577-8500. List Price: \$495. Requires: 512K RAM, graphics display for print preview, DOS 2.0 or later. Not copy protected. Reviewed: April 14, 1987, page 143. CIRCLE 861 ON READER SERVICE CARD

MathCAD 1.1

If the sight of equations packed with Greek letters and other mathematical symbols sends you running for cover, stay away from *MathCAD*: mathematical paraphernalia is what this \$249 package is all about.

MathCAD succeeds at the exacting task of letting mathematically minded professionals enter, display, and arrange equations on-screen much as they would on paper, complete with summation and integral symbols and the like. For an engineer, such a product has the same sort of appeal that a word processor does for a writer.



But *MathCAD* is much more than a nice way to manipulate equations: as you enter expressions, equations, and mathematical functions, *MathCAD* automatically calculates the results.

Features such as its ability to carry out calculations over a variable's range of values give *MathCAD* the kind of power approaching that of a

full-scale programming language.

Entering equations to appear as you'd write them on paper is easy from the start: *MathCAD* understands algebraic logic and interprets input accordingly. Editing equations takes a bit of practice, however, primarily because you have to remember that you're editing in algebraic logic as well.

MathCAD's impressive list of built-in functions includes engineering favorites such as the fast Fourier transform, J and Y Bessel functions, and trigonometric functions.

MathCAD can also handle interpolation and iteration and can compute integrals and derivatives. You can graph any relationship with only a few keystrokes.

Version 2.0 (\$349), due on the market by the time this issue is in print, will also include matrix operations and the ability to solve simultaneous equations.

MathCAD truly ranks among the most innovative and effortlessly powerful packages I've used. Trying to summarize its features here is tantamount to packing a few thousand pounds of sumo wrestlers into a Yugo.

Just take my word for it: *MathCAD* is the best thing to happen to the engineer since the pocket protector.

—Mitt Jones

FACT FILE: *MathCAD*, Version 1.1; MathSoft Inc., One Kendall Sq., Cambridge, MA 02139 (800) MathCAD (outside MA), (617) 577-1017. List Price: \$249. Requires: 512K RAM, one disk drive, DOS 2.0 or later. Supports: IBM CGA, EGA, or Hercules monochrome/graphics or color graphics card, or compatible. Not copy protected. Reviewed: April 14, 1987, page 162.

CIRCLE 847 ON READER SERVICE CARD

Microsoft Bookshelf

It's like something from out of a Fifties sci-fi magazine or an early James Bond movie. A real honest-to-goodness dictionary with meaty definitions and a fat biographical/geographical appendix. Plus an almanac, a spelling checker, a ZIP code guide, a



stripped-down *Roger's TheSaurus*, and some fairly useless manuals tossed in to pad the thing out. And all of it at your fingertips in almost real time. No more juggling stacks of heavy books on your lap, or poring over fine print, or having to retype facts, quotes, and statistics.

The package should be about twice as fast and half as expensive (it's outrageous to have to pay almost \$1,000 for a CD player that's nearly identical to a \$150 CD Walkman). But Microsoft added lots of nice touches and made everything so easy and accessible you'll find it hard to pry yourself away. In a world of dull, me-too products, *Microsoft Bookshelf* is an absolute astonisher. —Paul Somerson

FACT FILE: *Microsoft Bookshelf*; Microsoft Corp., 16011 NE 36th Way, Box 97017, Redmond, WA 98073 (800) 426-0800, (206) 882-8080. List Price: \$295. Amdek Laserdrive and Bookshelf software. \$1,285 (available from Amdek

Corp. at (800) PC-AMDEK). Requires: CD-ROM disk drive, 640K RAM, or 512K RAM with hard disk (recommended); MS-DOS CD-ROM extensions; DOS 3.0 or later version. Reviewed: October 27, 1987, page 33. CIRCLE 835 ON READER SERVICE CARD

Microsoft Excel for Windows

Will it become a smash success? Can anything even dent, let alone puncture, the *Lotus 1-2-3* bubble? Stay tuned to the best soap opera the PC industry has ever staged. By all rights (and assuming that 1-2-3, Release 3, and 1-2-3/G, both due in the next few months, aren't even more spectacular), *Microsoft Excel* ought to climb to the top of the PC spreadsheet charts.

But Life, as Jimmy Carter loved to tell us, Isn't Fair.

After all, *Excel* has superb graphs and charts, intelligent recalculation, good use of arrays (where *Excel* saves just one copy of a formula that saves memory), variable line spacing for "annual-report quali-



ty" printouts, easy point-and-shoot entry of functions, and dozens of other features. If life were fair, these strengths would persuade even the doubters—including those suspicious because of *Excel*'s introduction on the Macintosh—at least to take a look.

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■ BEST OF 1987

Whether the market takes that look, then buys—or relegating *Excel* to the role of another also-ran in the Lotus derby—for the time being, *Excel* stands at the top of the list of powerful, innovative, usable spreadsheets, clearly one of the very best new products of '87. —Jim Seymour

FACT FILE: *Microsoft Excel for Windows*; Microsoft Corp., 16011 NE 36th Way, Box 97017, Redmond, WA 98073 (206) 882-8080. **List Price:** \$495. Current users of *Microsoft Multiplan* can upgrade for \$250. **Requires:** 640K RAM, AT or 386 machine, hard disk drive, color/graphics monitor (EGA and mouse recommended), DOS 3.0 or later. Not copy protected. **Reviewed:** November 10, 1987, page 34.

CIRCLE 653 ON READER SERVICE CARD

Microsoft Mach 20 Performance Enhancement System

What can turn your sluggish old PC or PC-XT into an AT-class machine ready to run OS/2—without taking up an extra slot (and maybe even freeing one)? Answer: Micro-

Microsoft MACH 20

Microsoft

soft's Mach 20. I've tested only a slightly flaky beta version available at press time; production models ought to be fine.

The base-model Mach 20 is essentially an extra-feature version of PCSG's excellent

8-MHz Breakthru turbo card, whose 286 processor and 16K fast-RAM cache take advantage of the RAM already in your machine and improve performance to nearly AT speed. The first extra feature is a built-in mouse port. But the most important plus may

Brain transplant surgery for old PC-XT machines has never had a more optimistic prognosis.

well be a simple promise: Microsoft guarantees the Mach 20 will run a special edition of OS/2—a claim, for arcane technical reasons, virtually no other turbo card can currently make.

Out of slots? No problem. Disk Plus, a cheap, tiny add-on floppy disk controller, lets you chuck your old controller card and offers the extra flexibility of handling all IBM-sanctioned 5¼-inch and 3½-inch drive types. Memory Plus, a second add-on board, comes with 512K of RAM and holds up to 3.5MB. It can backfill motherboard RAM to the 640K DOS limit, and it fully supports the new LIM 4.0 expanded memory spec.

Configured in a 16-bit data bus, the Memory Plus RAM works even faster than 8-bit cached system memory, so only the machine's 8-bit wide I/O and the slow hard disks common in PC- and PC-XT-class machines will prevent AT-class performance. But you can't easily mix Memory Plus's memory with add-on memory elsewhere in the system; the rec-

ommended solution is to yank chips from other boards and plug them in here.

Good as this one-slot solution is, it'll probably get better. A 12-MHz edition is likely (as with PCSG's Breakthru); so perhaps is a version based on the 386-in-a-286-form-factor chip the Dvorak rumor mill has many of us drooling about (see *PC Magazine*, Inside Track, December 8, 1987). Brain transplant surgery for old PC-XT machines has never had a more optimistic prognosis. —Stephen Manes

FACT FILE: *Microsoft Mach 20 Performance Enhancement System*; Microsoft Corp., 16011 NE 36th Way, Box 97017, Redmond, WA 98073 (800) 426-9400 (206) 882-8080. **List Price:** Mach 20 Board, \$495; Disk Plus, \$99; Memory Plus, \$395. **Requires:** IBM PC or XT, Compaq Portable, or compatible; one expansion slot. **Reviewed:** Not previously reviewed.

CIRCLE 656 ON READER SERVICE CARD

The New Microsoft Mouse

Microsoft announced its new mouse with much fanfare and evident pride—but to a trade press that murmured privately about all the attention being given to a mere mouse. Microsoft knew better, however; it knew that the right mouse—not just any mouse—would be an important aspect in the future of graphical environments.

IBM also recognized this importance and included a mouse with its PS/2 line. But IBM's heart wasn't in it. With its large size and clumsy raised buttons, the IBM mouse runs counter to current thinking on alternate input device design. Microsoft, on the other hand, looked closely at its own previous mouse and

those of its competitors, and conducted a great deal of original research, using design and human-factors experts to try to create the best alternate input device that current understanding would allow.

The result of Microsoft's



investigation gave rise to a mouse of another color—literally. The high-gloss stark white mouse has two buttons separated by a slightly raised ridge. One button is twice the size of the other, so that you don't have to look at the mouse when you use it to tell them apart. Both buttons are flush to the mouse surface, using microswitches that need very little movement to be triggered, yet they respond with a click that is both audible and tactile.

In a world of one-size-fits-all mice, the new Microsoft mouse seems the best compromise: it is larger than the mouse used with the Macintosh, but smaller than the old Microsoft mouse. And unlike the old Microsoft, Mac, Logitech, and IBM mice, the new Microsoft mouse uses a ball located at the front—another design change that contributes to this mouse's ease of use. For better or worse, the new mouse uses the existing

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Microsoft MS MOUSE driver, which is the closest that we have to a standard in the MS-DOS mouse kingdom.

IBM's inclusion of mice with its PS/2 line and the growing use of the Macintosh in the workplace have validated the use of mice for many naysayers. And the need to use a mouse with such important new packages as *Excel* and *PageMaker* has created interest among the as yet unconverted. Microsoft deserves applause for advancing the state of the art of input technology when it already had a strong seller in its hands. —Philip F. H. Rose

FACT FILE: The New Microsoft Mouse; Microsoft Corp., 16011 NE 36th Way, Box 97017, Redmond, WA 98073 (800) 426-9400, (206) 882-8080 List Price: With MS Paintbrush, \$150; with Microsoft Windows 2.0 and Z-Soft's PC Paintbrush, \$200; with EasyCAD from Evolution Computing, \$175. Requires: 384K RAM, CGA, EGA, or Hercules adapter, DOS version 2.0 or later. Reviewed: January 12, 1988.

CIRCLE 627 ON READER SERVICE CARD

Microsoft OS/2 Software Development Kit

OS/2 won't be officially available until the first quarter of 1988, but that doesn't mean you're stuck writing DOS programs until then. Microsoft's OS/2 Software Development Kit lets programmers get a head start in writing applications for this

controversial protected-mode operating system.

As of September, the OS/2 Software Development Kit included a beta-test version of the OS/2 Kernel; pro-

The ultimate fate of OS/2 remains to be seen, but the debate has already started and will intensify during 1988.

tested-mode versions of the Microsoft C Compiler, Macro Assembler, and Linker; a full-screen editor; 11 manuals; attendance at a 3-day seminar, with two additional manuals reproducing all the overhead slides; eight VHS tapes that allow you to relive the seminar in the privacy of your home or office; a 1-year subscription to the Dial bulletin board; and a 1-year subscription to the colorful *Microsoft Systems Journal* magazine. Expected in December 1987 is the OS/2 Presentation Manager and more manuals.

The ultimate fate of OS/2 remains to be seen, but the debate has already started and will intensify during 1988. Will OS/2 supplant DOS? Will it inspire developers to create programs not possible under today's environments? Or will OS/2 die a slow death as users turn to 80386 control programs and LIM 4.0 expanded memory to meet their needs under good old DOS? Only time will tell, but few programmers who have taken a serious look at OS/2 have come away unimpressed.

The OS/2 Software Development Kit is a programmer's dream package—and all for the mere price of . . . well, let's not talk about the price.

—Charles Petzold

FACT FILE: Microsoft OS/2 Software Development Kit; Microsoft Corp., 16011 NE 36th Way, Box 97017, Redmond, WA 98073 (800) 426-9400, (206) 882-8080 List Price: \$3,000 Requires: 80286 or 80386 with 1.5MB RAM, 2MB with DOS in compatibility mode, 3MB including Presentation Manager; hard disk. Software not copy protected. Reviewed: Not previously reviewed.

CIRCLE 628 ON READER SERVICE CARD

Microsoft Windows 2.0

While OS/2 was still a twinkle in Microsoft's eye, the company created *Microsoft Windows*, a new front end to MS-DOS that allows some of the advantages of a more graphically based system without deserting the DOS standard. Although it's classifiable as an operating environment, *Windows* has had to travel the same route that operating systems follow when they are introduced: it's taken several years for a solid base of software that takes advantage of *Windows* to grow.

In 1987, with the growth of desktop publishing and what Microsoft has dubbed the Graphical User Interface, *Windows*, Version 2.0, became a product that couldn't be ignored. The migration of Aldus Corp.'s *PageMaker* and *Microsoft Excel*—among others, from the Macintosh world to MS-DOS was accomplished only with the Mac-like consistent interface and the programming assist *Windows* supplied. The biggest feather in Microsoft's cap has to be the reluctant

adoption of *Windows* by IBM. Remodelled and re-named the Presentation Manager by IBM, it is the front end for OS/2 and future IBM operating systems.

Although the future of OS/2 has been debated by some, most major vendors are making sure that they have at least one foot in the OS/2 camp, providing a large base



of software for *Windows* as well. And with *Windows 386*, a version of *Windows* 2 that runs on 80386-based machines, the ill-behaved old programs that never worked well under *Windows* can now be run and multitasked without worry.

The main reason to recommend *Windows* today is not the future path to OS/2, however, but the truly wonderful programs—such as *Microsoft Excel*, *PageMaker*, *Pro3D!* PC, and *Omnis Quartz*—that are coming to the MS-DOS world every day and are available only through *Windows*. It's no coincidence that these new programs come from the Macintosh world: the consistent and graphically oriented environment that Apple provided was fertile ground for software vendors, and it is a presage of things to come with OS/2.

—Philip F. H. Rose



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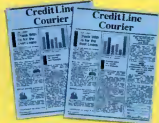
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FACT FILE: *Microsoft Windows, Version 2.0*; Microsoft Corp., 16011 NE 36th Way, Box 97017, Redmond, WA 98073 (800) 426-9400, (206) 882-8080 List Price: *Windows/386*: \$195; *Windows 2.0*, \$99. **Requires:** *Windows 2.0*: 512K RAM, monochrome graphics or color monitor, graphics adapter card, DOS 2.0 or later. *Windows/386*: 80386 processor, 1MB RAM, graphics adapter, DOS 3.10 or later. Not copy protected. **Reviewed:** Not previously reviewed.

CIRCLE 637 ON READER SERVICE CARD

Microsoft Word 4.0

Microsoft Word has grown in 4 years from big, dumb, baffling, and almost unusable (Version 1.0), to half-witted, sluggish, and promising but only marginally usable (Version 1.15), to smarter, powerful, still slow and tough to learn but worth the trouble for its Hewlett-Packard LaserJet printer support (Versions 2.0 and 2.1), to easy to learn and even more powerful (Versions 3.0 and 3.11), to this fall's Version 4.0: fast and smart, period.



Watching a successful program grow over time is like watching a teenager grow to something approaching maturity: no more elbows on the table during dinner, no more awkwardness around adults, no more junk thrown around the house.

In Version 4.0, *Microsoft Word* makes the biggest im-

provements I've ever seen in an already well-established program. The speed increase of this word processor is dramatic; powerful macros can automate complex tasks; document management screens, with intelligent search and retrieval features, have been added for those who like them.

In the continuing back-and-forth tug-of-war between *Microsoft Word* and *WordPerfect*, *Word* has pulled ahead. Your turn, *WordPerfect*.—Jim Seymour

FACT FILE: *Microsoft Word, Version 4.0*; Microsoft Corp., 16011 NE 36th Way, Box 97017, Redmond, WA 98073 (800) 426-9400, (206) 882-8080 List Price: \$450; upgrade, \$75. Users who licensed *Word* 3.10 or 3.11 after July 1, 1987, will receive upgrade at no extra charge. **Requires:** 320K, two floppy disk drives or one floppy and one hard disk drive, DOS 3.11 or later. Not copy protected. **Reviewed:** November 10, 1987, page 38.

CIRCLE 623 ON READER SERVICE CARD

Microvitec AutoSync 1019

NEC showed us why we want multiscanning displays. Others showed us why big displays are important. Now British monitor manufacturer Microvitec shows us how we can afford one.

Known previously in the U.S. mainly for its Cub line, an early but feeble effort to provide high-resolution monitors for PC-CADD systems, Microvitec has gotten it all together with its Definition series, introduced with a bang this year with the \$2,195 19-inch AutoSync 1019.

The AutoSync uses clever tricks, such as canting its CRT forward a couple of degrees to help defeat glare problems. It puts all the con-



trols on the front panel rather than hiding them on the back or under a trap door on top (are you listening, NEC?); then it goes a step farther and recesses them so that you won't accidentally bump one.

The AutoSync works with all the EGA and Super-EGA cards on the market, up through the 800 by 600 level that's beginning to look like the next plateau (it's hard to say "standard" in the PC display world with a straight face) after VGA. Even better, with different cables it also works on IBM PS/2s and even Apple Macintosh IIs. Dealers love that kind of economy in SKUs (stock-keeping units). And PC users love not having to trade in \$2,000-plus monitors every year to accommodate the newest versions of video display cards.—Jim Seymour

FACT FILE: *Microvitec AutoSync 1019*; Microvitec Inc., 1943 Providence Ct., College Park, GA

30337 (404) 991-2246 List Price: \$2,195 **Requires:** XT, AT, or compatible **Reviewed:** Not previously reviewed.

CIRCLE 624 ON READER SERVICE CARD

The AutoSync uses clever tricks, such as canting its CRT forward a couple of degrees to help defeat glare problems.

NEC Silentwriter LC 890

The NEC Silentwriter LC 890 is a 300-dot-per-inch laser printer that gives you everything found in the Apple LaserWriter Plus—and then piles on the goodies. The result is irresistible.

Although PostScript is nearly established as the stan-

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to get it into compressed mode?**

Duet's pop-up menu allows you to select compressed print or double width, letter quality or draft. You can change spacing, choose a font or easily command whatever else your printer has to offer. You can even advance your paper a page or a line at a time without having to approach your hardware. On laser printers you can choose between landscape and portrait modes, select paper tray and lots more. And you'll never have to memorize escape sequences to do it. Duet can make your word processor, spreadsheet or database report generator do things with the printer it never knew was possible.

When you need to stack up a bunch of files to be printed, do you ever feel like you're just groping in the dark?

With Duet, you can see a list of what's waiting to be printed, any time you want. You even have the ability to go in and shuffle things around, cancel files and individually configure print jobs for sideways or normal print.

Power failure? Printer jam?

Anyone who's been around printers for a while knows the feeling of groping around for a power switch while paper flies in all directions and the print head bores a hole in your masterpiece. That's why Duet saves print queues to disk. When you bring the power up again, or clear the confetti out of your printer, you'll be able to restart wherever you left off...or even back up a page or two if necessary.

Have you ever been forced out of your own office because someone came to visit while your printer was hammering away?

Duet lets you quiet your printer with a keystroke, and then start up again when it's convenient for you... and you'll never miss a character.

With all of its power, Duet is so easy to use that in five or ten minutes, it will feel like an old friend. And like any true friend, it's never intrusive. Depending on how you configure it, Duet can occupy as little as 60K of RAM.

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To order your copy of *Duet* direct, phone: 800-645-5501 or, in California dial 800-556-0699. Or mail us your name and address along with a check, money order, or your Visa, MasterCard or American Express number and expiration date. *California residents, please add sales tax (6.9%). For orders outside of the U.S. please add \$15. CSL 736 Chestnut Street, Santa Cruz, CA 95060. 408/426-7381

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dard page composition language for PCs, widespread software support of PostScript has been lacking. With most PostScript laser printers, the only alternative is a primitive nongraphics Diablo 630 emulation mode. The NEC Silentwriter LC 890 fills that gap by adding HP LaserJet Plus emulation, making the printer compatible with all the applications not yet quite smart enough to use PostScript but constrained with only a Diablo 630 environment.

The Silentwriter LC 890 has parallel, serial, and AppleTalk ports. The emulation modes and hardware interface are all selectable from an easy-to-use front-panel menu. The front panel also includes LCD status indicators that tell you about possible problems, using words rather than numeric codes.

Two paper bins are standard equipment. These extend upward from the rear of the printer, and paper is collected on top of the machine.

Result: none of the protruding trays so common on most laser printers. It's an unusual design that shows real thought and ingenuity rather than the more customary haste involved in simply banging out another clone.

The Silentwriter LC 890 is sturdy and built like a tank—and indeed, bulk is its only fault. Weighing in at 68 pounds, it's not the prettiest printer around. Fortunately, there's enough on the inside to compensate for its unsightly exterior.

—Charles Petzold

FACT FILE: NEC Silentwriter LC 890; NEC Information Systems Inc., 1414 Massachusetts Ave., Boxborough, MA 01719 (617) 264-8000 Price: \$4,795 Reviewed: November 10, 1987, page 200.
CIRCLE 662 ON READER SERVICE CARD

Nota Bene 2.1

If there's any word processing task that *Nota Bene* can't elegantly accomplish with two or three keystrokes,

you'll be hard put to find it.

Nota Bene started out as a program for scholars and scientists—for whom it still performs amazing tricks with footnotes, indexes, bibliographies, and automatically updated cross-references. But in Version 2.1, *Nota Bene* has matured into a program for everyone who writes anything longer than a memo. Beginners can use its *Lotus 1-2-3*-style menus to do everything from setting options on the spelling checker to searching the whole disk for a text string to downloading fonts. Diehard menu-haters can always jump to the command line.

Built around a customized version of *XyWrite III Plus*, *Nota Bene* 2.1 matches *XyWrite*'s speed while adding luxuries that *XyWrite* users only dream about. To choose only

Nota Bene started out as a program for scholars. But Version 2.1 is for everyone.

one example, *Nota Bene*, unlike *XyWrite*, remembers a search string and can return you to the point where you started searching. *Nota Bene*'s keyboard, always a marvel of intuitive logic, is now even easier to use than before. The program does a better job of controlling printers than any other word processor does—*Microsoft Word* included.

Nota Bene's long-awaited optional special-language supplements make this the only serious word processor capable of displaying and printing different alphabets in



the same document. Type a few lines in English, hit a couple of keys, and you're typing in Hebrew with full editing and word wrap, while the cursor moves from right to left. Press a help key, and a Hebrew keyboard diagram appears where the QWERTY layout was displayed a few moments earlier. You can choose supplements for biblical, classical, or Slavic studies—or for a combination of all available alphabets.

You'll need a Hercules Graphics Plus or EGA, as well as a graphics or laser printer, to run the special-language supplements. The standard English/European language version runs on absolutely anything, but it can display italics and superscripts only if you use the Hercules Graphics Plus.

Nota Bene is programmable and customizable to a fare-thee-well, but you can use it straight out of the box by following the menus. It's the only program to buy if you want everything—ease, power, speed, logic, and an endless range of conveniences and possibilities.

—Edward Mendelson

FACT FILE: *Nota Bene*, Version 2.1; Dragonfly Software, 285 West Broadway, #500, New York, NY 10013 (212) 334-0445 List Price: \$495; special-language supplements, \$95 each (all languages, \$195). Requirements: DOS 2.0 or later, two disk

Inside the revolution



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CIRCLE 725 ON READER SERVICE CARD

drives (hard disk recommended). 256K memory (384K RAM recommended); special-language supplements require an EGA or the Hercules Graphics Plus or Hercules InColor card. Not copy protected. **Reviewed:** July 21, 1987, page 43.
CIRCLE 661 ON READER SERVICE CARD

Okidata Laserline 6

Last year marked the arrival of the inexpensive laser printer. Now you can choose from a variety of lasers with street prices—and even some with list prices—of under \$2,000. For many people, the best bargain is the \$1,995 Okidata Laserline 6.

The Okidata Laserline 6 is built on the new Ricoh engine, which can print up to 6 pages per minute. Like the earlier Ricoh-engine-based machines, the Laserline 6 prints crisp characters and solid, evenly inked black images. The engine also offers both face-down and straight-through paper paths for reliable paper handling.

To this solid foundation, Okidata has added some important features. To make the Laserline 6 truly functional,

you need to purchase a separate personality module, but this Hewlett-Packard LaserJet Plus emulation card adds only \$200 to the Laserline's \$1,795 list price.

The Laserline 6 also comes equipped with a full complement of 15 different fonts in ROM, including proportional Times Roman and Helvetica type styles.

The Laserline 6 is limited in that it comes with only 128K RAM and can be expanded only to the half a megabyte that comes standard on most other HP LaserJet-class printers. For this reason, it is not a good choice for people who need to download a lot of fonts or produce extensive graphics, as might be the case in high-end desktop publishing applications.

But if you are looking for a powerful alternative to the traditional daisy wheel—a printer that runs swiftly and silently while producing eye-catching results—and if you can live with the Laserline 6's few limitations, then this Okidata represents a true value in today's printer market.

—Alfred Poor

FACT FILE: Okidata Laserline 6; Okidata, 532 Fellowship Rd., Mount Laurel, NJ 08054 (800) OKI-DATA. List Price: \$1,995, including personality module, toner, and image drum. **Reviewed:** November 10, 1987, page 654.
CIRCLE 660 ON READER SERVICE CARD

Org Plus 3.0

Org Plus continues to be the best organization chart generator, although it's no longer the *only* org chart generator (some graphics programs, especially *Harvard Graphics*, now build them in, too). The latest version of this \$79.95 single-purpose tool now allows you to enter and calculate several fields of financial or salary data (which do not print unless you specifically order them to be printed), allows staff positions (like executive secretary or office manager) to have subordinates, and allows import and export of files from *Lotus 1-2-3* and *dBASE III Plus*.

Not everybody needs to produce org charts. Managers and supervisors do, and for them, there's a payback the first one or two times they build an org chart. *Org Plus* lets you quickly clip and paste entire workgroups if you change reporting lines, and now you can calculate how much you're spending on salary (or equipment or benefits).

Org Plus still isn't quite perfect. The output can now be displayed on any screen, but you have to go through too many keystrokes to see it. Also, the program won't shrink a chart to fit the screen, which the more expensive *Harvard Graphics* does with aplomb. And Ken Hess, head of Banner Blue Software, rolls his eyes skyward when



thinking about the cost of supporting proportionally spaced laser printer fonts.

Org Plus represents programs that can be loosely classified as: Best of Show, Real World Division. Warts and all, they're a darn sight better than doing it by hand or typing names and drawing boxes with a free-form graphics program. The package is well worth the money.

—Bill Howard

FACT FILE: Org Plus, Version 3.0; Banner Blue Software Inc., P.O. Box 7865, Fremont, CA 94537 (415) 794-6850. List Price: \$79.95; upgrade \$25. **Requires:** 320K RAM, DOS 2.0. Not copy protected. **Reviewed:** March 10, 1987, page 284.
CIRCLE 670 ON READER SERVICE CARD

PageMaker

OK, so it's not so hot for long documents. And it still (if only rarely) goes bump in the night and crashes. And you have to buy nice-looking soft fonts from third parties, then convert them to *PageMaker*'s format before you can use them with a Hewlett-Packard LaserJet. And you need at least an 8-MHz AT as well as a hard disk.

No matter: Aldus Corp.'s *PageMaker* (\$695) is still the best general-purpose page-building program you can buy





for a PC or compatible.

PageMaker deserves its market-leading position not because it established the category of page-makeup software (although it did) or because it defined our expectations for desktop publishing programs (ditto), but because with it Aldus invented so many well-conceived stylistic and working methods that have now become the conventions in desktop publishing software. Then, too, *PageMaker* empowered the individual, who, in the words of journalistic iconoclast A. J. Liebling, discovered that "freedom of the press belongs to those who own one."

No program better illustrates what happened to PC software in 1987: It got bigger, started to adopt a graphical interface, discovered the mouse, and pushed PCs into new roles in American business. Nice job, Aldus.

—Jim Seymour

FACT FILE: *PageMaker*, Aldus Corp., 411 First Ave. South, #200, Seattle, WA 98104 (206) 622-5500. List Price: \$695. Requires: 512K RAM (640K recommended); IBM enhanced graphics adapter (EGA), Hercules graphics card, or other Windows-compatible display device; one floppy disk drive, one 10MB hard disk; *Microsoft Windows*, *Microsoft Mouse*, *Mouse System*, or other Windows pointing device; DOS 3.2. Not copy protected. Reviewed: February 2, 1987, page 119.

CIRCLE 650 ON READER SERVICE CARD

Paradox 2.0

Right out of the gate, 2 years ago, Ansa Software's *Paradox* 1.0 was a remarkably robust product. It came of age with Version 1.1, and now, with a little more time in the cask, Version 2.0 is dramatically better.

While *dBASE* users wondered when Ashton-Tate would fix the sluggish network performance of *dBASE III Plus*, Ansa was at work building a multiuser/network version of *Paradox* that has quickly become the state-of-the-art product among PC database managers.

Other DBMS products on networks use simple file- or record-locking to keep users from destroying file integrity. The result is that while user A is working on the record for Mrs. Smith's accounts, users B and C are at best frozen out. They may be able to see that record, but they see only how it was before A accessed it to



change it—not the results of those changes. Hence, such LAN DBMS products show not how things *are*, but how they *were*.

By contrast, Version 2.0 of *Paradox* updates the screens of users B and C as user A changes the record. That record is still protected from corruption, but now B and C are seeing "live" data

and working with facts, not history. They can even tell just who user A is, and they can see what restrictions have been placed on using that record.

You don't have to use *Paradox* on a LAN to appreciate the other improvements. The number of records per database has been increased to 2 million, a zoom command

Keep the faith, Philipe.
—Jim Seymour

FACT FILE: *Paradox*, Version 2.0; Ansa Software, 1301 Shoreway Rd., Belmont, CA 94002 (415) 595-4469. List Price: \$725; no charge for upgrade. Requires: 512K RAM, two disk drives, DOS 2.0 or later. On a network: 640K RAM, two disk drives, DOS 3.1 or later. Not copy protected. Reviewed: September 29, 1987, page 48.

CIRCLE 678 ON READER SERVICE CARD

While *dBASE* users wondered when Ashton-Tate would fix the sluggish network performance of *dBASE III Plus*, Ansa was at work building a multiuser/network version of *Paradox* that has quickly become the state-of-the-art product among PC database managers.

has been added, and the program now searches about twice as fast as Version 1.1. Meanwhile, the rest of what made *Paradox* so usable, from its easy-to-understand table views to comprehensive import and export routines to the vaguely *Lotus 1-2-3*-like menus, has remained unspoiled in Version 2.0. *Paradox* still reigns supreme as the thinking user's DBMS.

Borland acquired *Paradox* publisher Ansa Software during 1987, and some large corporate *Paradox* users have wondered about Borland's ability and willingness to support and continue improving such a sophisticated product. Only time will tell, but Borland's plans for the future of *Paradox*—which include moving it to other microprocessor families and operating systems and introducing Version 2.01 with superior EMS support—are a good sign.

PC's Limited 386-16

"Hurry up and wait" is a philosophy that may be somewhat more appropriate for Army types attacking adding machines than power users working on the latest high-performance hardware. With most 80386-based PCs, however, it's an apt description. Although capable of a blazing 16-MHz clock rate, most 80386-equipped computers impose wait states that slow system throughput by 25 percent or more.

The first 80386-based PC to do away with the artificial restraint of wait states completely, while adding several other performance-enhancing features, was the PC's Limited 386-16.

For those improvements alone, this machine would earn our nod as one of the best products of 1987, even if it were not much lower-priced

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S I G M A D E S I G N S



than the slower market leaders, IBM and Compaq.

Wait states—part of the PC lexicon since IBM added one to the AT—are required in most computers because the 80386 microprocessor is faster than most memory chips—at least the more affordable ones. But PC's Limited took the no-compromise approach in matching memory to microprocessor. To squeeze the last scintilla of speed from the system, the company selected the more expensive static RAM, banishing not only wait states but the need for memory refreshing, which also rather wantonly steals away some 6 to 10 percent of a computer's performance.

In addition, PC's Limited extended the full 32-bit bus of the 386-16 to its ROM memory, even allowing you to select special high-speed BIOS routines to pep up your EGA display. To improve the per-

formance of peripherals, the 386-16 lets you boost its expansion bus speed to 12 MHz instead of the more common 8 MHz.

Until the market is taken over by systems equipped with 20-MHz 80386 microprocessors (a new model from PC's Limited among them), the 386-16 is destined to be the ultimate performance machine. From a dollars-for-power perspective, it's the best bargain you can buy.

—Winn L. Rosch

FACT FILE: PC's Limited 386-16: Dell Computer Corp., 9505 Arbovitum Blvd., Austin, TX 78759 (800) 426-5150 **List Price:** With 1MB RAM, 1.2MB floppy disk drive, 40MB hard disk drive, and monochrome monitor, \$4,299; 40MB EGA system, \$4,799; with 70MB hard disk drive and monochrome monitor, \$4,699; 70MB EGA system, \$5,199; with 150MB hard disk drive and monochrome monitor, \$5,999 **Reviewed:** September 29, 1987, page 142. **CIRCLE 644 ON READER SERVICE CARD**

Plus Development HardCard 40

The disk-on-a-card usually looks like a shotgun marriage between a corpulent refugee from the Industrial Revolution (the disk) and an overdressed native of the Electronic Age (the card) performed under the beneficent auspices of Krazy Glue. Not Plus Development Corp.'s HardCards; designed from the start as integral packages, they look slick and perform that way. The top-of-the-line HardCard 40 is the biggest and best yet.

The HardCard 40 draws a meager 8 watts of power, making it work just fine even in a plain old IBM PC with its woefully inadequate power supply. Unlike its competitors, the HardCard fits in a single slot without overhang, making it perhaps the only hard-disk-on-a-card you'll ever see in a PS/2 Model 25 and many just-one-slot-left systems. The disk is so quiet that Plus Development supplies utilities to display an on-



screen indicator or emit an irritating tone during reads and writes. Fast 40-millisecond access times put the disk in the AT class. You can even run it in an AT, though its 8-bit data path may slow total

throughput down a bit.

The HardCard 40 cleverly uses an optical position encoder to avoid write errors. Air pressure changes park the heads automatically. Installation is a plug-and-play affair; if you've already got a hard disk, you need to move one jumper before proceeding. The biggest decision you have to make is how to divide the 40MB of storage to satisfy the 32MB DOS limitation. About the only drawback to HardCards is the premium price they command.


But you get an extra measure of quality for the extra price. Executive Editor Paul Somerson often says that the best way to increase productivity with your computer is to get a big, fast hard disk. He should know; he's crashed about seven of them. The HardCard 40 is rated to survive a 100g shock and run for 40,000 hours—roughly double what the best of the competition claims. Still, that rating is only the mean time between failures. In the interest of prudence, I'm not letting Somerson anywhere near my HardCard.

—Stephen Manes

FACT FILE: Plus Development HardCard 40: Plus Development Corp., 1778 McCarthy Blvd., Milpitas, CA 95035 (800) 826-8022, (408) 434-6900 **List Price:** \$1,195 **Requires:** One PC, XT, or AT expansion slot, DOS 3.0 or later. **Reviewed:** July 21, 1987, page 38. **CIRCLE 625 ON READER SERVICE CARD**

Publisher's Paintbrush

The first versions of ZSoft's *PC Paintbrush* were cute and cuddly—*MacPaint* from the Macintosh for graphics-starved PC owners. It was nice, finally, to have paint



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■ BEST OF 1987

programs that worked in color—though a little hard to figure out what to do with all that color, given the absence of suitable hard-copy output devices for PCs.



Then came the desktop publishing boom, and people discovered that there was a real need for these electronic sketch pads. ZSoft's .PCX format became the first widely accepted graphics format for importing art to DTP pages, further fueling the DTP expansion. This year ZSoft introduced *Publisher's Paintbrush*, an enormously expanded and improved version of *PC Paintbrush*, well suited to the legions of desktop publishers.

As many users rely on *Publisher's Paintbrush* for its ability to create and manipulate large type sizes as for its ability to help draw pictures. Because the HP LaserJet and similar laser printers are severely limited in their ability to handle the large type used in most PC-based DTP setups today—in contrast to the much more versatile PostScript-driven LaserWriter Plus found in Macintosh-based desktop publishing systems—*Publisher's Paintbrush* has become an essential tool in PC-based desktop publishing.

—Jim Seymour

FACT FILE: *Publisher's Paintbrush*: ZSoft Corp., 450 Franklin Rd., Marietta, GA 30067 (404) 428-0008. **List Price:** \$285. **Requires:** 640K (up to 2MB RAM for full-page 300-dpi images), two disk drives, graphics display, and drawing device. **Reviewed:** Not previously reviewed. **CIRCLE 672 ON READER SERVICE CARD**

QDR

QDR (for Quick Disk Reformatter) will save you more time than a 386 machine will—and it won't cost you a penny. Vernon D. Buerg's gift to the computer world re-formats your already formatted floppy disks in a second or two, instead of making you stare into space during the minute or so required by DOS. If you ever need to reformat a few dozen disks, *QDR* lets you get home in time for dinner.

This little gem clears all files and subdirectories from a disk by clearing out the file allocation table (FAT) and the root directory. But it preserves the FAT's list of sectors blocked out when the disk was first formatted. If



you insist, it will do a full format like the one that DOS does. It can also write a new volume label.

Currently, *QDR* supports all standard disk formats except 1.44MB 3½-inch disks. Buerg updates the program

every few months, so you can expect this format to be supported soon.

—Edward Mendelson

FACT FILE: *QDR, Version 2.9*: Vernon D. Buerg, 456 Lakeshire Dr., Daly City, CA 94015 (415) 994-2944 (BBS). **List Price:** Free when downloaded from a BBS. **Requires:** One disk drive. Not copy protected. **Reviewed:** Not previously reviewed.

CIRCLE 677 ON READER SERVICE CARD

QuickBASIC 4.0

There is no disputing that Bill Gates and Microsoft are solely responsible for turning BASIC into the most popular programming language available for microcomputers. Millions of Apple II, Commodore 64, and IBM PC and compatible computers include a version of the Microsoft BASIC interpreter.

But with the introduction of QuickBASIC, Microsoft has created a powerful, full-featured programming language. Even the most cynical "structure" fanatics and BASIC bushers must now agree that BASIC is a serious development language.

QuickBASIC, Version 4.0, takes BASIC into an entirely new dimension by adding source-level debugging, huge arrays, unlimited string space, support for Hercules graphics, and a wealth of other important features.

Among the best new features in QuickBASIC 4.0 are user-definable variable types and record structures. Like the field statements used to manipulate random access data files, record structures allow the programmer to combine different types of data (string, floating-point) into a single entity that may



be referred to by name.

Perhaps the most impressive new feature of all is the threaded p-code interpreter. Unlike traditional compilers that process an entire program at one time, QuickBASIC 4.0 uses an incremental compiler that converts each line of source code as it is entered. What makes this system so impressive is its ability to stop a program's execution, examine variables and make changes to the source code, and then resume execution. Further, QuickBASIC programs can now call routines written in any of the other Microsoft languages, and vice versa. BASIC has indeed come of age. —Ethan Winer

FACT FILE: *QuickBASIC, Version 4.0*: Microsoft Corp., 16011 NE 36th Way, Box 97017, Redmond, WA 98073 (206) 882-8080. **List Price:** \$99, upgrade \$25 for users of QuickBASIC 3; \$35 to upgrade from earlier versions. **Requires:** 320K, DOS 2.1 or later. Not copy protected. **Reviewed:** December 8, 1987, page 33.

CIRCLE 676 ON READER SERVICE CARD

Rodime Double Play

IBM pioneered using hard disks to anchor high-performance PCs with the introduction of its PC-XT. The tradition continued with the PC

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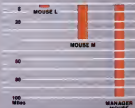
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Now the Manager Mouse family has a new leader: Manager Mouse Cordless! PC Magazine says, "...[the] light-beam transmission scheme is amazingly accurate, and the freedom it affords is wonderful." Computer Graphics Today calls it "the hottest new mouse on the block." You will be amazed at how convenient it is to use. Manager Mouse Cordless operates up to 10 hours on a single charge, and it works effectively within four feet of its receiver, which mounts conveniently on any IBM PC or compatible.



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AT, equipped with the hard disk most likely to get disassembled. The new PS/2 Model 50 comes complete with a hard disk anchor, too—one that drags system performance down to the depths.

One rationale for Big Blue upping calculating speed by 25 percent while slowing data access by 50 percent in the Model 50 is the quest for compactness. Downsizing forced the use of a tiny, 3½-inch hard disk drive, and small size precludes the use of high-speed head-moving mechanisms, at least for most disk drive makers.

Not so for Scottish disk-maker, Rodime, a company that claims to have developed the first 3½-inch hard disk, besides producing models with access times as low as 28 milliseconds. That's even better than IBM's full-size AT drives.

Putting one of those little speed demons into a Model 50 was a tempting proposition. It's also an expensive

one, considering that IBM won't sell a Model 50 without a hard disk, and that IBM also slightly modified the industry-standard interface so that the Model 50 drive won't work with anything else.

Throwing out a functional albeit slow hard disk is hardly a cost-effective mass storage solution.

In a stroke of ingenuity, Rodime solved both the Model 50 performance problem and the disk disposal issue. The company's Double Play kit includes both a truly fast (28 millisecond) 45.5MB hard disk modified for the Model 50 and a controller/installation kit for sliding the old IBM Model 50 hard disk into the otherwise floppies-only PS/2 Model 25 (a machine for which price and not performance is the major selling point).

Granted, few folks own both a Model 50 and a Model 25, so Rodime's Double Play is designed for installation by dealers who can take advantage

of the swap. Hence the Model 50 is finally blessed with disk performance up to its potential; and the Model 25, with a hard disk endowment. The benefits also include no waste and (we hope) lower prices for you, the final purchaser.—Winn L. Rosch

FACT FILE: Rodime Double Play; Rodime Inc., 901 Broken Sound Pkwy. NW, Boca Raton, FL 33431 (305) 994-6200 **List Price:** \$1,495 **Requires:** Personal System/2, Model 50. **Reviewed:** December 8, 1987, page 38. **CIRCLE 669 ON READER SERVICE CARD**

Saba Technologies Handscan

If you spend a lot of time rekeying typed or computer-printed material into your PC, the Saba Technologies Handscan may be the answer to your dreams. This inexpensive (\$650), hand-held text scanner can read printouts that are too wide to fit in a desktop scanner or that are bound with other pages. What's more, the hand-held design lets you scan only specific lines or parts of lines, so you can selectively cut and paste data into a spreadsheet or database program.

The Handscan works as a supplement to the keyboard. Once you've loaded your word processor, spreadsheet, or database manager, you can then use the Handscan to feed in text, just as if you'd typed it in. The hand-held unit looks and feels like an oversized mouse, complete with buttons on top. To read text, you hold down the read button and scan across the page, one line at a time.

To simplify matters when entering values into spreadsheets and database pro-

grams, the Handscan software can strip out format characters, such as dollar signs and commas. It can also substitute characters for you. Tell it to change multiple spaces to a Right Arrow key, and it will automatically add the Right Arrow key between columns of data. Scan a row with this setting, and each item in the row will automatically be entered in its own cell. Tell Handscan to change multiple spaces to a Down Arrow key, and it will automatically convert a row of data into a column.

Currently, Handscan can read only 16 fonts. Saba Technologies divides these into three categories: mainframe laser (IBM 3800 and Xerox 9700), letter quality (variations on Courier, Prestige, Pica, and Letter Gothic), and dot matrix (the NLQ



mode of specific Epson, IBM, Okidata, and Toshiba printers). This obviously limits its usefulness of the unit. Still, if you have any control over the production of the output, 16 fonts may be more than enough.

What Handscan reads, it reads impressively well and fast. If the fonts you need are included in Saba's list, Handscan will do the job. Just don't try reading in the stock tables from *The Wall Street Journal*.—M. David Stone



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FACT FILE: Saba Technologies Handscent; Saba Technologies, 9300 SW Gemini Dr., Beaverton, OR 97005 (800) 654-5274, (503) 641-8530 (in Ore.) **List Price:** \$649 **Requires:** 512K RAM (640K recommended), two disk drives (third disk recommended), one full-length expansion slot, DOS 2.1 or later. **Reviewed:** October 13, 1987, page 317. **CIRCLE 667 ON READER SERVICE CARD**

SeeMORE for 1-2-3

Ever want to squeeze just a little more of your *Lotus 1-2-3* spreadsheet onto your screen? Will you put up with smaller characters and give up a little legibility in return for more rows and columns visible at once? Are you using Release 2.0 or later of *1-2-3*? Presto! I give you *SeeMORE* for 1-2-3, a Lotus add-in from Personics Corp., the people who brought the idea of sticky notes to PC screens with *SmartNotes*.



If you've got an Enhanced Graphics Adapter and an appropriate monitor, or a new VGA-equipped IBM PS/2, *SeeMORE* will let you move up from the usual 1-2-3 display of 76 columns (characters) by 20 lines to 106 columns by 43 lines, 128 columns by 43 lines, even 160 columns by 58 lines—which is so small that you won't be able to read the numbers on your screen, but

you'll be able to get a very useful bird's-eye overview of the layout of the worksheet.

You'll also be able to change colors on-screen, get bigger type for the command line than you've chosen for the rest of the worksheet, get smaller type on the command line when you're displaying a long macro or formula, capitalize all alpha characters for better legibility—and save your preferences as defaults.

Other add-ins focus on turning *Lotus 1-2-3* into something it isn't—a word processor or sophisticated database. *SeeMORE* works at making 1-2-3 more usable, and succeeds, brilliantly. Nice name, too.

—Jim Seymour

FACT FILE: *SeeMORE* for 1-2-3; Personics Corp., 2352 Main St., Concord, MA 01742 (617) 897-1575 **List Price:** \$79.95 **Requires:** *Lotus 1-2-3*, Release 2.0 or later; CGA, EGA, VGA, or Hercules Graphics adapter. Not copy protected. **Reviewed:** August 1, 1987, page 51. **CIRCLE 668 ON READER SERVICE CARD**

Show Partner F/X

Toss a coin. Simple, right? Not if you're attempting it on a PC screen. Unless you're using *Show Partner F/X* from the Syracuse, NY-based Brightbill-Roberts and Co.

Although a bunch of vendors was making a lot of noise last year about products that support a new application category known as desktop presentation, the truth is that Brightbill-Roberts has been hard at work on such a product for years. And its original desktop presentation package, *Show Partner*, has earned a large and loyal following.

The original *Show Partner*



has some drawing and animation capability and a single sound effect, but the recently released *F/X* version takes these features and builds a powerhouse tool for creating slide shows on your screen. The program offers the standard screen-capture utility (plus a special version that grabs *Windows* screens) and a full-featured script editor, which supports more different wipes, dissolves, and fades than can be tastefully used in a single presentation. The package also comes with programs that convert shows prepared with the original *Show Partner* or with the popular but limited *IBM StoryBoard*.

The excitement starts with the extras. For one, you're not stuck with the 29 different type styles that come standard with the program, but by using *F/X*'s screen font editor you can easily create or modify characters. *Show Partner F/X* shows you what each character will look like while you are working on it. The package even has utilities that let you convert *F/X* fonts to *PC Paintbrush* or *Hercules RAMFont* fonts.

But *F/X*'s font gymnastics represent only part of the package's power. Once you've broken loose on the type front, how about shaking the foundations a bit? *F/X* makes animation easier by

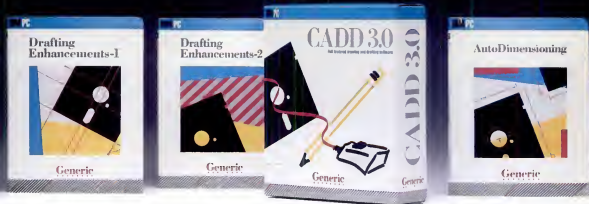
providing you a fixed window in which to work. You can also replicate an image, then move or edit the image before storing it as the next frame in an animation sequence. You can indicate a wandering path for an animated object by dragging the cursor around, and the object, whether it's a spinning coin or twirling baton, will obligingly trace the path on the screen.

Show Partner F/X's animation capabilities won't put Disney studios out of business, but its extra sound effects, storage of frequently used frames, ability to call DOS and high-level language programs from within a

Show Partner F/X makes animation easier by providing a fixed window in which to work.

script, scrolling text windows within an image screen, and support for a wide range of graphics display adapters make it as powerful and versatile a product as almost anyone could want. It even includes a run-time module with a free unlimited license so that you can distribute your masterpiece slide presentations without additional cost. If you need a program to make you look good, this one looks great. —Alfred Poor

FACT FILE: *Show Partner F/X*; Brightbill-Roberts and Co. Ltd., University Bldg., #421, 120 E. Washington St., Syracuse, NY 13202 (315) 474-3400 **List Price:** \$350 **Requires:** 256K RAM for CGA or Hercules monochrome display (384K RAM for EGA or VGA), one disk drive, DOS 2.0 or later. **Reviewed:** March 10, 1987, page 249. **CIRCLE 665 ON READER SERVICE CARD**



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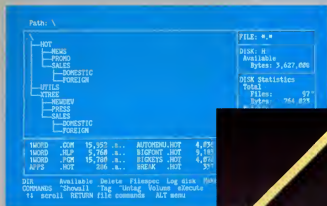
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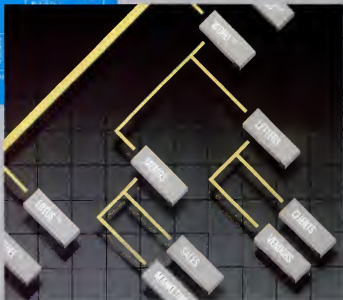
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■ BEST OF 1987

3Com Ethernet on Twisted Pair

Transforming a technical concept into real products isn't easy, but 3Com Corp. has done just that. The company has been able to translate a challenging concept—a 10-megabit-per-second data rate on a single pair of telephone wires—into products that are both practical and flexible.

Several companies have networks with Ethernet-like protocols running over twisted-pair wiring, but their products have low data rates and little flexibility. The new 3Com products, developed in cooperation with Digital Equipment Corp., maintain a high data rate and offer an easy way to combine twisted-pair, fiber-optic, and two different kinds of coaxial cabling. 3Com also delivers a small, easy-to-use, yet highly sophisticated tool for the analysis and diagnosis of wiring problems on mixed-media networks.

Among these new products is the 3Com PairTamer, which replaces coaxial cable with one of the unused pairs of wires in a typical telephone wiring bundle. You install the PairTamer in place of the existing modular telephone outlet. Both the telephone and LAN plug into the PairTamer, and the Ethernet network and telephones coexist without interference.

The 3Com MultiConnect repeater allows the use of any combination of media on one network without using complex software for bridging. Up to 45 modules string to-

The 3Com LanScanner finds bad cable connections using sophisticated Time Domain Reflectometry techniques. It also monitors cables for problem causing noises and pulses. This device works on many types of cables and can be held in one hand.

LAN planners need a choice of wiring alternatives. 3Com has given them choices by converting a challenging engineering problem into flexible and economical LAN cabling products.

—Frank J. Dertler, Jr.

Toshiba T1000

No one has ever accused me of being a laptop fan, but Toshiba's slim, trim 6.4-pound T1000 could change all that. It's the answer to full-featured portables that are just too heavy to be comfortably lugged around and machines that give up some functionality for their lighter weight and smaller size. The \$1,199 T1000 strikes a balance between brains and bulk.

A 4.77-MHz 80C88-based MS-DOS machine that has 512K of RAM and takes standard IBM 3½-inch 720K floppy disks, the Toshiba T1000 also has a nonbacklit supertwist LCD display that is more than readable. This configuration should suffice for users who need to do real work during their daily commute from home to office. But the best news is the Toshiba's light weight. At a mere 6.4 pounds, it's slim enough to slip into my soft-sided briefcase and light enough that I don't regret taking it with me even when I don't use it.

With the T1000, Toshiba has performed two clever tricks with memory that make work easier. The company has placed MS-DOS 2.11 on a ROM chip from which you can boot the system, thus making it possible to leave your main data disk in the floppy disk drive, with the full 720K available for your applications. In addition, Toshiba offers an optional, rather expensive (\$549) 768K RAM card that backfills to

640K of conventional memory, with 640K to use as RAMdisk and/or EMS memory. A RAMdisk of 384K can be maintained for up to 48 hours when you turn the machine off.

The T1000 has only one floppy disk drive, but I have not found this to be problem in daily use. I have one 720K floppy with *SideKick* (which is included with the T1000), *Crosstalk*, and *Lap-Link* on it, and I have more than 500K left for data. I use the *SideKick* notepad to knock out quick documents, but there is plenty of room on the disk for a more robust word processor. As long as the disk is formatted for 720K, it can be used in IBM's 1.44MB 3½-inch drives. The T1000 also has an internal modem, but it is not the same slide-in type used in the Toshiba T1100. Installing it was a much more complicated and dangerous procedure than a user should be expected to go through.

The closest thing yet to the perfect laptop, the Toshiba T1000 should answer most users' complaints about previous machines. With its light weight and slim design—and at a street price of about \$800—the affordable T1000 could become as commonplace a briefcase item as the \$150 Filofax organizer or \$200 HP calculator. It certainly has changed the way I use computers.

—Philip F. H. Rose



FACT FILE: Toshiba T1000; Toshiba America Inc., Information Systems Division, 9740 Irvine Blvd., Irvine, CA 92718 (714) 583-3000 List Price: With Borland's *SideKick*, DOS 2.11 in ROM and 512K memory: \$1,199; 1,200-bps modem, \$399; 768K RAM card, \$549.

HAYES ANN TECHNOLOGICAL MODEMS THAT IM

It's long been thought that even the best of technology eventually becomes obsolete. A notion that we at Hayes could never really understand. And certainly never accept. So in defiance of it, we created the V-series Smartmodem 9600™ and V-series Smartmodem 2400™. Modems that actually get better as they get older. Because they not only incorporate the most intelligent features found in modems today, they also possess the capability to provide a long-term growth path into the communications environments of tomorrow.

V-SERIES SMARTMODEM 9600

This is the fastest modem we've ever made. It can send and receive data at 9600 bps and with adaptive data compression achieve an effective throughput of up to 19,200 bps. Point-to-point error control, forward error correction and data flow control ensure that data gets there accurately.

The V-series Smartmodem 9600 also comes with automatic feature negotiation, a self-operating capability that analyzes all options for modem link and then selects the optimum feature set with any Hayes modem for the most efficient transmission at the highest shared speed.

Synchronous and asynchronous communications modes as well as simulated full-duplex employing advanced CCITT V.32 trellis code modulation and fast turnaround ping-pong technology are also part of the package. Plus you'll get the capability to link up with a range of networks, including SNA. And soon V-series technology will offer an X.25 PAD option to further accommodate network environments of today. And the future.



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V-SERIES SMARTMODEM 2400

With adaptive data compression this modem can achieve an effective throughput of up to 4800 bps. Of course, it too offers point-to-point error control, forward error correction, data flow control, automatic feature negotiation and synchronous as well as asynchronous communications modes. And like the V-series Smartmodem 9600, it can link up with a wide range of networks, such as SNA, and be enhanced with an X.25 PAD option.

V-series modems come in stand-alone versions and internal versions (V-series Smartmodem 9600B™ and V-series Smartmodem 2400B™). Internal versions are bundled with our powerful new Smartcom III™ communications software.

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Turbo Basic

It's not hard to understand why so many newcomers to PC programming choose BASIC as a first language—it's always been the easiest to learn and use. And with a total programming environment like Borland International's Turbo Basic at the ready, even novice programmers can soon write programs that look as if they've been polished by a professional.



Borland pioneered the concept of a total programming environment with Turbo Pascal and then Turbo Prolog. Turbo Basic continues the tradition by providing BASIC programmers with a lightning-fast *WordStar*-style editor and the ability to compile and execute programs in memory without having to leave the editing environment.

But what really makes Turbo Basic special is its blinding speed, small size, and many added commands. Programs compiled with Turbo Basic are often much faster and smaller than those produced by other compilers.

Among other speed-up tricks, Turbo Basic's direct screen writing gives programs a truly professional ap-

pearance. To obtain the same display speed with other BASIC packages would require assistance from external assembly-language routines. Further, Turbo Basic requires no additional LINK step to create a final, standalone .EXE program.

And then there are the new commands—lots of them. A Binary file access mode allows programs to read and write any part of a disk file directly. A long integer variable type accommodates a wide range of numbers while still providing the tremendous speed advantage possible only with integer values. Add to these a full complement of loop control commands, plus 8087 support, and it's not hard to see that Borland has produced a real winner.

—Ethan Winer

FACT FILE: Turbo Basic; Borland International, 4585 Scots Valley Dr., Scotts Valley, CA 95066 (800) 543-7543 List Price: \$99.95 Requires: 256K RAM, DOS 2.0 or later. Not copy protected. Reviewed: March 10, 1987, page 34 CIRCLE 663 ON READER SERVICE CARD

Turbo C

Taking compilers and program development tools into the next generation is Borland International's Turbo C, a \$99.95 package that will stun you with in-RAM compilations that operate at warp speed. While Turbo C's integrated environment, ANSI compatibility, and rich features won't write your programs for you (at least not yet!), the package does include everything the C aficionado or novice will need for serious program development.

Turbo C begins with an in-



tegrated programming environment that uses pull-down menus and moving-bar options, then builds from there. The program includes a project "make" facility, full-screen editor, compiler, linker, and options screens.

While professional programmers have long used make utilities to recompile modified source files automatically, Turbo C's project make also builds a "pick list" of files that can be stepped through for multiple-file editing. The integrated editor has complete full-screen editing capabilities and a configurable key arrangement.

The compiler is fast and furious (over 10,000 lines per minute on an 8-MHz AT), with a choice of six different memory configurations plus flexible optimizations. The compiler window displays the number of lines processed as they are compiled (show-off?) as well as the memory remaining for compilation. Error-trapping options can be set to find nonportable code, non-ANSI code, and errors that most compilers never notice; code that will never be executed or variables that are never used. There is even an option to generate a warning when a function is defined or called without one of the new ANSI function prototypes.

Once a program has been compiled and linked, you can run it right from Turbo C. You can also specify the command-line arguments to be passed to the program every time it runs. The Turbo C environment setup (options, the location of needed files, and so forth), can be saved and changed on the fly.

Got an error compiling that program? In the tradition of Borland's other compilers, the source file will be displayed in the edit window and the cursor positioned on the offending line. Need to find out how to use an option? Not sure what a command will do? Context-sensitive help screens pop up with a keystroke; they are available for most of the functions of Turbo C. A second keystroke brings up a complete index to all of the necessary on-line

Context-sensitive help screens pop up with a keystroke; they are available for most Turbo C functions.

help topics. I find that I only use the manual to investigate some of the additional library functions or interface capabilities.

The Turbo C function library is replete with support for interrupt trapping, plus DOS and BIOS interface routines. The library source is available from Borland for under \$150.

Turbo C lets you include in-line assembler code right in your C source file (just prefix the line with "asm"). You can modify the registers of

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Expansion Slots	7*	7**	2
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the 8088 directly by using the register variables, `_AX`, `_DL`, and so on. Also, there is full support for near and far pointers in all models.

Even though the DOS linker can be used, the TLINK linker is a no-frills fast replacement that's worth just as much as the entire package.

OK, so you don't like menus and you'd prefer to compile your C the old-fashioned way? A command-line version of the compiler is included.

Finally, as if all that weren't attractive enough, the whole package sells for less than \$100—a 21st-century compiler at a preinflation 1967 price. Is it any wonder that Turbo C was included in the best of 1987?

—Richard Hale Shaw

FACT FILE: Turbo C; Borland International, 4585 Scotts Valley Dr., Scotts Valley, CA 95066 (800) 543-7543 List Price: \$99.95 **Requires:** 384K RAM, DOS 2.0 or later. Not copy protected. **Reviewed:** September 29, 1987, page 33.

CIRCLE 663 ON READER SERVICE CARD

Turbo Pascal 4.0

Four years ago Borland International was a tiny, little-known company above a garage in Scotts Valley, California. Back then, Borland shocked the microcomputer world by offering a Pascal compiler for \$40 when the going rate was closer to \$400. This year Borland—now a software giant—released Version 4.0 of that compiler, and the price is still under \$100. Now Turbo Pascal users can create programs with no 64K limit on code size and with a wealth of new features. Pascal was once regarded



as a teaching language only, unfit for serious use. Borland disproved that idea with the original Turbo Pascal compiler, and its latest manifestation is anything but academic. Besides the integrated compiler and editor, it includes the important MAKE and BUILD tools for managing large projects. MAKE means recompile any portions of a project that have changed, and BUILD means recompile every part of a project.

The old compiler created small, fast code. The new compiler is smaller and faster. Turbo Pascal 4.0 allows separate compilation of units and "smart linking." Smart linking means no wasted code—only the portions of a unit that you actually use will get compiled into your program. The compiler itself is also faster, with reported speeds of 27,000 lines per minute. That's about twice as fast as Version 3.0.

Like its predecessors, Turbo Pascal 4.0 has an integrated editor. The new editor has a pull-down-menu user interface like that of Borland's Turbo C and Turbo Basic. Unlike any previous version, the latest also includes a command-line compiler separate from the editor.

Borland has made its name by selling low-priced,

high-quality language products. Turbo Pascal 4.0 will only add to this reputation.

—Neil J. Rubenking

FACT FILE: Turbo Pascal, Version 4.0; Borland International, 4585 Scotts Valley Dr., Scotts Valley, CA 95066 (800) 543-7543 List Price: \$99.95. To upgrade from Version 3.0, \$39.95 plus \$5.00 shipping. **Requires:** 192K RAM, command-line version; 384K RAM, integrated environment version; DOS 2.0 or later. Not copy protected. **Reviewed:** Not previously reviewed.

CIRCLE 662 ON READER SERVICE CARD

TurboTax 4.0

You probably think tax preparation software is worth the trouble for accountants only. Filling in those ugly little 1040 boxes is hard enough, you say. Who wants to learn new software to do a job you've been doing just fine since you were a teenager?

That's what I thought, both before I tried a tax program and after. All they did was put the 1040 on the screen and do simple addition and subtraction. I had to consult the tax tables. I had to know the tax regulations. I had to know which forms to fill in. And it was easier to copy it over again by hand than deal with the awkward

printing requirements.

That was in 1986. That was before I tried ChipSoft's TurboTax. Maybe I'm too easily persuaded. After all, it merely saved me several hundred dollars by pointing out deductions I didn't even know I was eligible for. TurboTax entered the deductions automatically and put the savings right on the bottom line. It didn't even ask me if this was OK.

Well, maybe I'm dumb for not staying up nights with the federal tax code and a loophole detector. But I know how long it takes me to do my taxes and how long it can take me to learn a new program. TurboTax is a real is a time-saver.

Once you've filled in its questionnaire, it lets you know which forms you have to fill out. It has handy touches, like easy linking of related schedules to the 1040 form, and a what-if section so you can play guessing games without meddling with your actual return. It also handles state forms without asking you to reenter your basic tax information.

The only thing TurboTax doesn't do is file an amended return for a previous year.

—Gus Venditto



FACT FILE: TurboTax, Version 4.0; ChipSoft, 5045 Shoreham Pl., #100, San Diego, CA 92122 (619) 453-8722 List Price: \$140. **Requires:** \$75; each state form, \$40. **Reviewed:** February 24, 1987, page 34.

CIRCLE 660 ON READER SERVICE CARD

UNlock MasterKey

Lotus Development Corp. pretty much brought down the curtain on copy protection when it preannounced, by the

BEST OF 1987

better part of a year, that 1-2-3, Release 3, would do away with copy protection. Lotus's change of heart notwithstanding, the battle over the ability to back up program disks freely has been fought on near-equal footing ever since Mike Brown's *Copy II PC* from Central Point Software hit the streets in 1982. For those remaining skirmishes—existing copies of 1-2-3, the oddball database or project manager, and all too many accounting programs—the *UNlock MasterKey* series from TranSec Systems is the ultimate equalizer. This \$159.95 package contains unlocking tools for dozens of specific programs and for generic schemes as well.



Unlike less-sophisticated methods that simply make a still-protected duplicate or intercept the Interrupt 13 request that interrogates drive A: for the master disk, *UNlock* makes you a duplicate of the original disk without copy protection. You're then free to install the program without worrying about the conflicts with hard disk reorganizers or tape backup systems caused by the hidden files deposited on your disk. You can also port the program to your 3½-inch-drive portable. Regardless of the dire warnings on the shrink-wrap user agree-

ment and license (an ironic phrase, since the fine type gives the software vendor all the license, not you), you really should have the right to use one copy of the program wherever, whenever you like, so long as no one else is using it somewhere else at the same time.

UNlock can also be a money-saver. In big companies, a few boneheaded users lose their master disks sooner or later; when an upgrade is released, you need to return the original disk to get a discounted upgrade. So the company is stuck choosing between using some old copies and some new ones or buying a whole new round of programs for some users.

It goes without saying that *UNlock* can be used for good or evil, and should be used only on behalf of the forces of good—users fed up with arrogant software companies.

—Bill Howard

FACT FILE: *UNlock MasterKey*; TranSec Systems Inc., 220 Congress Park Dr., #300, Delray Beach, FL 33445 (800) 423-0772, (405) 276-1500. List Price: \$159.95; updates, \$35. Requires: 256K RAM, DOS 2.0. Not copy protected. Reviewed: November 24, 1987, page 220. CIRCLE 626 ON READER SERVICE CARD

Windows Graph 1.0

Windows Graph stands as the graphics package of choice for users whose charted data begins life in a 1-2-3 worksheet, who wish they could make full use of the fonts in their laser printers, or who have big plans for desktop publishing with *PageMaker*.

With *Windows Graph*, you can overlay multiple graphs with ease—for instance, a bar chart of the past



10 years' sales under a line graph of your company's market share over the same period. You can stretch and scale the chart (proportionally or in one dimension) for an exact fit on the printed page.

This Mac-like \$395 program lets you take advantage of any printer, film recorder, or slide maker that *Windows* knows about, and you can use all the fonts built into the output devices. No more will you curse your old graphics program for generating spindly dot-matrix-caliber fonts on a \$3,500 laser. Of course, being married to *Windows* forces you to work . . . at . . . *Windows*' . . . leisurely . . . pace. Easy transfer of paint images and artwork among *Windows* programs is another advantage of membership in the *Windows* family.

Windows Graph gives you the functional equivalent of style sheets that let you save the format of a graph, plug in new numbers periodically (1-2-3 worksheet files can be read in directly), and print results with only a few swipes of the mouse. (For unattended mass production of multiple graphs, however, nothing touches Lotus's new \$495 *GraphWriter II*.) Products like *Windows Graph* herald a bright future for *Windows*. —Bill Howard

FACT FILE: *Windows Graph*, Version 1.0; Micrografx Inc., 1820 N. Greenville Ave., Richardson, TX 75081 (800) 272-3729, (214) 234-1769. List Price: \$395. Requires: 512K RAM, Microsoft Windows, graphics adapter (mouse, 640K RAM, AT-class PC recommended). Not copy protected. Reviewed: September 15, 1987, page 48. CIRCLE 633 ON READER SERVICE CARD

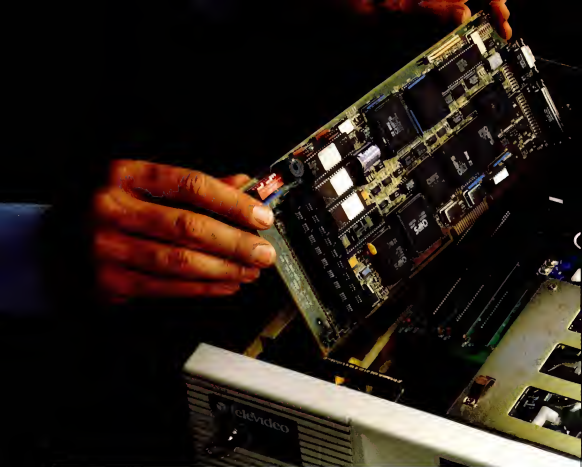
Write-in

Amid a small flood of Lotus 1-2-3 add-ins during 1987, including three very different word processing add-ins, one program stands out for elegant design and immediate usefulness. Blossom Software's *Write-in* brings real word-processing to 1-2-3 devotees, with more style and more-appropriate functionality than the other entries.

Written by people who developed the add-in capability for 1-2-3 while at Lotus, *Write-in* goes beyond the simple memo-writer paradigm to offer something like the of standalone WP programs—with the convenience of a 1-2-3 add-in. No one's going to confuse *Write-in* with a top-of-the-line, full-featured word processing program, but it fills the bill for most 1-2-3 users' WP needs.

By adopting simple tricks found elsewhere (for exam-





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TelOAS/I has a passive back plane with 4 board slots. It accepts 8088 or 80286 boards in a low-profile case with a small footprint that fits anywhere. Use it as a LAN diskless workstation. Or, if you configure it with an

8088 board, floppy disk drives, a 14" monitor and keyboard, you have an IBM® PC/XT™ compatible pc.

TelOAS/II.

TelOAS/II has 5 board slots for 3 half-height drives and accepts either the 8088, 80286 or 80386 boards. You can configure it as a 386 with a high resolution monochrome monitor, hard disk and streaming tape drives, and Microport DOSMerge® 386 software and have a small-footprint workstation that runs both MS-DOS and UNIX System V.3.

TelOAS/III.

TelOAS/III has 8 board slots, room for 4 full-height and half-height drives,



Kinds Of Possibilities.

and is suitable for either the 80286 or 80386 boards. One of your many options is to configure it as a 386 and add an EGA standard color monitor, 80387 math co-processor, optical mouse, a hard disk and the right software to get a powerful 386 engineering workstation. It's also the right size for a LAN file server or multi-user host system.

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CIRCLE 176 ON READER SERVICE CARD

ple, a *Microsoft Word*-like style sheet), *Write-In* automates parts of the word processing task in a way that will gladden the hearts of dedicated *I-2-3* users—who usually prefer crunching numbers, not words, anyway.

Write-In also stores text in a separate file outside the *Lotus I-2-3* worksheet. The value of this approach is a matter of some dispute in the add-in community: there are good arguments for storing add-ins' work inside the worksheet. Suffice to say that by eliminating the possibility that a user will accidentally overwrite a critical section of a worksheet with text, *Write-In* comes down on the side of saving users from themselves. And that's exactly the kind of approach most *I-2-3* users want when they turn to an add-in product to provide a secondary function for their beloved primary tool.

—Jim Seymour

FACT FILE: *Write-In*; Blossom Software Corp., 1 Kendall Sq., #2200, Cambridge, MA 02139 (617) 666-2144 List Price: \$99.95 Requires: *Lotus I-2-3*, Release 2.0 or later; DOS 2.0 or later. Not copy protected. Reviewed: August 1, 1987, page 36.

CIRCLE 631 ON READER SERVICE CARD

XyWrite III Plus

With the addition of an integrated thesaurus and an on-line spelling checker (predictably, the fastest we tested), *XyWrite III Plus* has substantially widened its appeal to office workers and professional writers alike. At the same time, its new ability to insert printer-ready graphics files from any source and to embed any printer control codes anywhere in a document

makes *XyWrite III Plus* the premier product for preparing text for desktop publishing.

Simply by switching *XyWrite*'s printer-control files you can output your document to a Hewlett-Packard LaserJet Series II, a PostScript-based Apple LaserWriter, or a Linotronic 100 or 300 typesetter.

Most of the macros that I've seen written for other word processors enable them to do, slowly and laboriously, one or another of the things that *XyWrite* does—with breathtaking speed—right out of the box.

Do I need to track down a 38-byte difference between two 80K .ASM listings for next issue's Utilities column? I just call up the two files (they automatically load successively into two of *XyWrite*'s nine windows), then hit Ctrl-Minus to look for a difference; and a missing comment line in one of the listings is found in less than one second.

Do I need to write a 7-line display quote for column 2 on layout page 9? Two keystrokes activate a very simple *XyWrite* macro, after which I can type and edit the display quote (with its larger type and introductory square bullet), knowing that every word- and line-break will come back from the type house exactly



as I see it on my screen and on my hard-copy printout.

Is there a *WordStar* document to be edited? Enter the command XLT (translate), give the filename, and up it comes in *XyWrite*, stripped of its high-bit characters and ready to edit. Do I need to make some editing changes provisional, to be checked out with the author? The new Redline command gives me edit-trace protection.

If you wonder how an issue of *PC Magazine* can be produced every 10 working days, part of the answer is that every document in the magazine is edited using the fastest, most powerful, most flexible word processor on the market: *XyWrite III Plus*.

—Craig L. Stark

FACT FILE: *XyWrite III Plus*, Version 3.52; XyQuest Inc., P.O. Box 372, Bedford, MA 01730 (617) 275-4439 List Price: \$445; upgrade from *XyWrite II Plus*, \$150; from *XyWrite III*, \$50. Requires: 256K RAM (384K with spelling checker), two floppy disk drives, DOS 2.0 or later. Not copy protected. Reviewed: October 13, 1987, page 360. CIRCLE 632 ON READER SERVICE CARD

Zenith Perfect Monitor, Model ZCM-1490

Look in the dictionary under *dazzling* and you're likely to see the notation, *syn. Zenith*. A year and a half ago it was the shimmering iridescent blue backlit screen of the Z-181 laptop portable. Now it's the Zenith Perfect Monitor for IBM's PS/2 line, a \$999 marvel with a perfectly flat screen that effectively eliminates glare while producing brighter whites and richer, deeper colors.

This washday miracle of a monitor is an effective counterpoint to IBM's wimpy analog monitors for the PS/2 line, which contributing editor Charles Petzold calls the Too Series: one's too small, one's too grainy, and one's too expensive. With Zenith's \$599 Z-449 adapter card (or IBM's similar card), which generates an analog video signal, the Perfect Monitor can be used on any existing PC using the original, non-Micro Channel bus. Since the VGA specs include a 640 by 350

Switch on a serious surge suppressor.



With test after test proving that 70-90% of all PC malfunctions can be traced to power problems, a surge suppressor is the first accessory you should buy for your PC. But don't put your trust in just any surge suppressor. Get one that gives your whole system superior protection. One that's engineered to the highest specifications.

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PC surge suppressors. And the most serious. Because at Kensington, we're dedicated to giving your PC the best possible protection.

That's why Master Piece and Master Piece Plus are equipped with our unique two-stage surge suppression circuit, containing a high-speed silicon semiconductor for the quick reaction necessary and heavy-duty metal oxide varistors for the brute force required to keep even the largest surges from penetrating into your system.

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And that's why the circuitry in both models can handle anything an electrical storm or your local power company can offer — up to 6,000 volts with a 3,000 amp follow-on current. (That's the kind of superior performance that passes not only UL* testing, but Categories A and B of the strict IEEE* specification 587-1980 as well.)

Now, this may look to you like we're taking more than the necessary precautions. And actually, we are. But after all, isn't that what you expect from a serious surge suppressor?

Master Piece (\$149.95) and Master Piece Plus (\$159.95). For more info, or a dealer near you, call (800) 535-4242. In NY (212) 475-5200.

Meets IEEE 587-1980 Category A	✓
Meets IEEE 587-1980 Category B	✓
UL Listed	✓

The right surge suppressor passes all the tests.



KENSINGTON. 

■ BEST OF 1987

EGA-compatible fallback mode, all your existing software runs fine on the monitor.

The Zenith screen is so flat, it almost looks concave to users who've tricked their minds into believing the gently rounded face of every other

thin VGA screen into something cordless that fits under your arm, the Zenith Z-183 Portable PC is the road machine of choice.

You can buy capable laptops today that are faster than the Z-183 and have better

Zenith's technical tour de force stands as a delightful reminder that the Yanks can best Japan on video display technology. The tube is made on a Zenith assembly line in Melrose Park, Illinois, and Zenith plans to produce a TV set based on the Perfect Monitor in 1988.

monitor is flat. The result—a flat-faced screen—may seem like a no-brainer, but after investing \$50 million in R&D, Zenith reports that nothing bigger than a 14-inch screen can be built in production quantities as yet.

Zenith's technical tour de force stands as a delightful reminder that the Yanks can (occasionally) best Japan on video display technology. The tube is made on a Zenith assembly line in Melrose Park, Illinois, and Zenith plans to produce a TV set based on the Perfect Monitor in 1988. —Bill Howard

FACT FILE: Zenith Perfect Monitor, Model ZCM-1490; Zenith Data Systems, 1000 Milwaukee Ave., Glenview, IL 60025 (800) 553-0305 List Price: \$999 Requires: VGA adapter. Reviewed: November 10, 1987, page 48. CIRCLE 629 ON READER SERVICE CARD

Zenith Z-183 Portable PC

Until someone out there figures out how to squeeze a PS/2 Model 80 and a wafer-

keyboard layouts (the NEC MultiSpeed) or that take up less space in your luggage (the Toshiba T1200 Plus). But Zenith's lush, dazzling, true-aspect, full-size screen still puts the others to shame. And its sleek styling, crisp

keyboard action, and sturdy construction make the competition look like toys for the 6-and-under set.

I wish it weren't such a vigorous aerobic exercise to haul through airports, and you'll have to pack a spare battery to make it coast-to-coast. But if you do a lot of travelling, want the best, and don't mind building up your biceps by pumping plastic, take one of these beauties home. —Paul Somerson

FACT FILE: Z-183 Portable PC; Zenith Data Systems, 1000 Milwaukee Ave., Glenview, IL 60025 (800) 842-9000, (312) 699-4800 List Price: With 640K RAM, one top-mounted retractable 3½-inch floppy disk drive, one 20MB hard disk drive, firmware diagnostics and debugger, external drive connector, MS-DOS 3.2, \$3,499; 300/1,200-bps modem, \$399; carrying case, \$59; external battery pack recharger, \$29; automobile cigarette-lighter power adapter, \$19. Reviewed: July 21, 1987, page 244. CIRCLE 634 ON READER SERVICE CARD



Zoo Keeper

C'mon: Do you really know where everything on your hard disk is lurking? Hasn't your hard disk become something of a... well, a zoo? Zoo Keeper will help you get



the tigers back in their cages.

Zoo Keeper lets you attach up to 40 characters of descriptive text, plus up to three keywords, to each of the files on your hard disk. Then, when you can't remember where you stored a file—or even what the exact filename is—just give Zoo Keeper as much as you do remember about the file, and it'll race through your directories, searching for your errant file.

The 40-character tags on filenames will get you hooked on Zoo Keeper. It's going to be nice to get away from baffling FOOSNABL WK1 1-2-3 filenames. Aah... —Jim Seymour

FACT FILE: Zoo Keeper; Polaris Software, 613 West Valley Pkwy., #323, Escondido, CA 92025 (800) 338-5943 List Price: \$75 Requires: 32K RAM; hard disk and one floppy disk drive; CGA, EGA or monochrome monitor; DOS 2.0 or later. Not copy protected. Reviewed: November 10, 1987, page 46. CIRCLE 630 ON READER SERVICE CARD

Racal-Vadic Defines Dazzling Performance.

"If there's one
modem that really
stands out in this
crowd of clones,
the 2400VP is it."

—PC Magazine



Someone finally shed some light on what a real modem ought to be.

After benchmarking eighty-seven 1200 and 2400 bps modems, PC Magazine didn't call our 2400VP just another modem.

They called it Editor's Choice.

Of course, we were grateful. But not surprised.

At Racal-Vadic we've been producing some of the industry's most feature-rich, cost-

effective, "tough-as-a-brick" modems for over 17 years.

For us, the 2400VP is business as usual—a shining example of what price/performance is all about.



PC Magazine agreed: *"The 2400VP brings a number of features formerly found only on very expensive mainframe modems to the PC community at a very competitive price."*

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mands of up to 120 characters.

Add to that the full ATPlus™ command set, automatic data/voice switching, and automatic speed conversion; and it's easy to see why this modem outshines everything in its class.

So if you're ready for more than just another modem, you're ready for the 2400VP.

For more information—and a copy of the 2400VP's brilliant performance comparisons—call Racal-Vadic today, toll free, at **800-482-3427**.

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- LANDMARK 10MHz
- CPU SLOT/CARD DESIGN
- 238WT POWER SUPPLY
- **TWELVE EXPANSION SLOTS**
- ONE 1.2MB FLOPPY DRIVE
- SERIAL AND PARALLEL PORTS
- ENHANCED 101 KEYBOARD
- OPERATIONS MANUAL
- ONE YEAR WARRANTY

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60MB (23ms) \$2195

130MB (13ms) \$3495

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CIRCLE 386 ON READER SERVICE CARD



ABORT, RETRY, FAIL?

In addition to the best and brightest of 1987, there's also the most memorable. Herewith, PC Magazine salutes the people, products, and marketing strategies that helped the year turn out the way it did.

So That's Why the Call Never Got Through

Two IBM employees shared a \$12,814 award for suggesting IBM use leftover PCs as call-handling and logging devices at IBM's Atlanta and Chicago customer-support centers.

Arnold Schwarzenegger Award

Heavyweight 1987 software releases: AutoCAD 2.62 with AutoShade, 12.3 lbs.



Illustration: Roger Roth

Paradox 2.0, 11.6 lbs.
Microsoft Excel, 9.0 lbs.
MultiMate Advantage II, 8.88 lbs.
Microsoft Word 4.0, 8.45 lbs.

Plus ça change Department: So Instead They Hired Loretta Swit?

When it brought out the PS/2 line in April, IBM's advertising department exchanged the Little Tramp for the "M*A*S*H" team.

It Takes /2 to Tangle

IBM sued AST Research for using "/2" in the name of AST's Advantage/2 memory board.

And He Didn't Even Have Rosemary Woods to Help

When Oliver North erased from his computer sensitive information detailing his involvement in the contra affair, he forgot that IBM's Profs system kept a complete backup on-disk



He was looking for the e-mailman? Thought Dynamics mailed this advertising poster promoting its Fetch file librarian.

in the White House's basement computer room.

He Bought It Secondhand from Colonel North

A British drug runner got a 30-year sentence when Customs agents confiscated his Psion Organiser, a \$160

handheld computer and data recorder he used to keep track of deals. The smuggler was careful to erase the incriminating details from RAM. But Customs discovered the Organiser kept a mirror image in a nonvolatile EPROM.

How to Win Friends and Influence Congress

Toshiba's U.S. sales of laptop computers slumped in the wake of publicity over a Toshiba subsidiary's \$16 million milling machine deal with Russia. The transaction helps the Soviets build quieter submarine propellers.

It Needed Killing Anyway

Datamation ran a picture of "Congressional Toshiba bashers" taking "sledgehammers [to] a laptop" in front of the Capitol building. The Toshiba RT-6016 is a portable all right, but not a laptop—it's an AM/FM-cassette boombox.

How Appropriate

One of the reviewers in *PC Magazine's* special report on accounting (September 15, 1987) was John Cashdollar.

The Secret of Great Demos . . .

Tandon president Chuck Peddle, introducing the company's new removable hard disk Personal Data Pacs to a meeting of Wall Street analysts, demonstrated the shock resistance of the units by tossing one onto the floor. It broke and wouldn't run.

. . . Is Timing

Tandy's 10th anniversary press conference and Model 4000 introduction began at 8:45 A.M. EDT at the Waldorf-Astoria hotel in New York City. More than 1,000 Tandy Computer Center managers and Business Group members watched the intro live by satellite link in Fort Worth, Texas

(where it was 7:45), and in Anaheim, California (at 5:45 in the morning).

. . . But These Graduates of the John Roach Finishing School Got to Sleep In on August 3

More than a half-dozen top Tandy managers quit Tandy in a 6-week period last summer for Dell Computer Corp. (PC's Limited) in Austin, Texas.

Diogenes, We've Found Your Man

Ex-Tandy VP Graham Beachum said he jumped to Dell Computer because of the "tremendous opportunity for personal wealth."

The Little Engine that Couldn't

While conventional wisdom has it that desktop publishing calls for superfast ATs or 386 machines, IBM's "SolutionPac Personal Publishing System" (*Windows*, *PageMaker*, a \$2,199 laser printer, and a \$1,950 printer adapter) only runs on the Model 30, the slowest machine in IBM's PS/2 lineup.

. . . And Probably Wouldn't

The \$1,950 Page Printer Adapter board required to operate IBM's laser printer nearly overloads the Model 30's power supply, making it impractical to use any of the machine's remaining expansion slots.

Scissors Not Included

When dealers complained that some PS/2 machines couldn't reliably format 1.44MB microfloppy disks, IBM sent them a DOS 3.30 patch utility on 5¼-inch floppies.

Generous to a Fault

HP's new flying wedge, the HP Portable Vectra CS laptop computer, measures 14 by 17 by 4 inches and weighs 18 pounds in its lightest configuration.



Next Week, 3M Unveils Its Scotchgard Line

Kodak will sell Verbatim disks with Teflon coatings for PC users who routinely spill coffee.

Donna Rice Wasn't Available

PC World ran an autographed foldout picture of Microsoft chairman Bill Gates.

Back to School

"Wheel of Fortune letter-spinner Vanna White, tired of being labeled a dumb blonde, is taking computer science courses and has become quite the high-tech whiz."

—Blurb in the August 11, 1987,

Globe



What's wrong with this picture (a 16 by 20 poster mailed to the media)? Brother has no laser printers.

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■ ABORT, RETRY, FAIL?

Don't Rush Us

Version 4 of the *Textra* word processor from Ann Arbor Software lacks printer drivers.

We Didn't Say There'll Never Be a Printer Driver

Ann Arbor Software now sells *Textra* by subscription. Users pay up front for the program and the promise of additional features to be mailed out as semiannual "editions" over the next 18 months.

Silk Purse, Sow's Ear

Toshiba bundles *Lotus Symphony* with its Model 3100 AT compatible laptop.

America's Future Rides on Its Young People

Barron's Computer SAT Study Program defines disks this way: "These are the small black squares with the holes in the middle."

Do You Feel Lucky, Computer?

A New Jersey man frustrated with his PC pumped eight hollow-point bullets into the machine. A policeman who investigated said the .44-caliber magnum was "a pretty big gun for shooting a computer."



Great advertising: Ven-Tel promises its modems have "fewer working parts."

1987 Vaporware-Comes-to-Life Award

Announced in April 1985, *Crosstalk Mark IV* shipped 2 years late—in May 1987. It was originally scheduled to ship in June 1985.

Oops

Zenith misspelled its "Quality Goes in Before the Name Goes On" slogan on the cover of its annual report.

Over Here They're Called Power Users

A Danish man who spent 12 to 16 hours daily with his PC was placed in a mental hospital suffering from "computer syndrome" after he began to think and talk in code. The man told doctors he would wake up at night thinking things like "LINE 10 GOTO THE BATHROOM." ☹



For
those
who
may
have
missed
it!

We at Bedford have always said we have a pretty special accounting program, one that combines functionality with useability. If you have been shopping for an automated accounting solution lately, you are likely overwhelmed by the number of software publishers who are making similar claims of their products.

Not all the claims can be true. In an effort to help clarify the offerings, PC Magazine, in conjunction with Price Waterhouse, published the results of an exhaustive survey of 59 top accounting packages. It was compiled from the results of a jointly developed testing script, used to evaluate more than 300 features and requiring 35 hours of hands-on testing for each program.

On September 15, 1987, nearly five months later the study was made public. If for some reason, you could not read that issue, the following excerpts should give you some idea of what you've been missing.

"Bedford Integrated Accounting is proof that it's possible to design a simple, effective PC accounting program that most people can use."

"...the user guide has clear, concise installation instructions and a tutorial."

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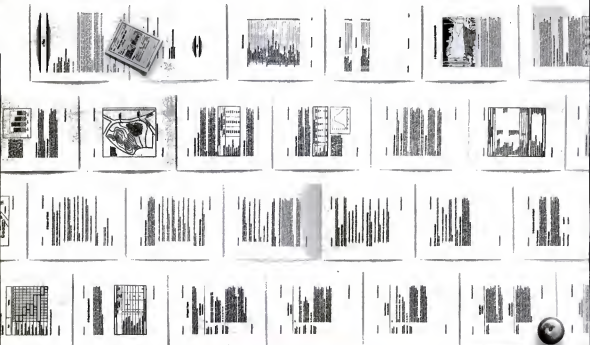
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You can globally format an entire Manuscript document, or format by sections.



With our Document Preview feature you can see how any page will look before it's printed. Zoom capability lets you take a closer look at graphics and equations.

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Our powerful Print Formatter gives you control over the look of your document, from position and size of graphics, to fonts, point sizes and more.

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of today's printing technology, from dot-matrix to laser, including PostScript® printers.

Manuscript is designed to work on most IBM® PCs and compatibles.* Its familiar 1-2-3 interface makes it easy to use. And our Manuscript evaluation kit makes it easy to try. For \$10.00, you'll get a presentation disk, working software, and a tutorial manual. To get your evaluation kit, call **1-800-345-1043** and ask for demo kit Q1-1450.



Lotus Manuscript

AWARDS FOR TECHNICAL EXCELLENCE:



AND THE WINNERS ARE...

The Awards for Technical Excellence have become a tradition in the personal computer industry. This year we add awards for lifetime achievement and special product development.

This past November, amid the glitter and excitement of Fall Comdex, we recognized 12 products, the ones that have most significantly advanced the state of the art of the personal computer since this time last year. The recipients, by and large, were the designers, engineers, and programmers responsible for the products. The awards are for technical achievement, not marketing prowess.

Here are the finalists and winners, with our accompanying thoughts on what made these products outstanding among the undeniably tough competition.

APPLICATION SOFTWARE

FINALISTS

Lucid 3D/Personal Computer Support Group

Sam Redman
Michael Stanford

**Microsoft Excel for Windows/
Microsoft Corp.**

Microsoft Excel Team

Paradox 2.0/Ansa Software
Richard L. Schwartz
Robert E. Shostak

Of all the categories, application software is doubtless the toughest. Users get intimately involved with applications and invest a major portion of their lives in learning their idiosyncracies. The technical intricacies often lurk far beneath the surface, providing ease of use and powerful features that are easy to take for granted.

Finalist: Paradox 2.0.

When the uninitiated see *Paradox* in action on a LAN, they say, "So what? That's what computers are supposed to do." Trouble is, most of them don't. *Paradox*'s real-time, interactive update is a boon to workgroup computing. This, on top of *Paradox*'s already excellent query, report generation, and programming facilities, makes it the fastest up-and-comer in the crowded database market.



Winner (tie): Lucid 3D

Lucid 3D is a spreadsheet for our times. Besides having the usual collection of spreadsheet features, it allows each cell to be a window onto another entire spreadsheet, as deep as you like. Conversely, you can combine existing sheets into a master. *Lucid* sports both minimal recalc and background recalc. Best of all, it is lovingly crafted, byte by byte, into less than 90K of code that can run as a pop-up program. It's a technical tour de force in an era that seems to have forgotten how to write tight code.



Winner (tie): Microsoft Excel for Windows

Excel is the first significant Windows application. Sure, the page layout programs and graphics packages are neat, but *every* one can use what *Excel*'s got. The spreadsheet is powerful enough for anyone, the graphics put some dedicated programs to shame, and the macro language is an application developer's delight. What's more, *Excel* takes advantage of Windows' Dy-

namic Data Exchange, giving it the power to run other applications and collect data. Far more than being a port of a Macintosh product, *Excel* fully exploits the power of the PC.

DESKTOP PUBLISHING

FINALISTS

PageMaker/Aldus Corp.
Jeremy Jaech
Ted Johnson

Publisher's Type Foundry/Z-Soft Corp.
Andy Lipscomb/East Valley Graphics
Neal White III
Mark Zachmann

Ventura Publisher 1.1/Xerox Corp.
Don Heiskell
Lee Lorenzen
John Meyer

An abiding confusion lingers in desktop publishing: whether it is a technique or a market. We at *PC Magazine* feel strongly that it is a technique—and a valuable one. In the unending quest for better-quality output, products in this category have improved the appearance of output while making layout far easier.

Finalist: PageMaker

If you can have only one desktop publishing program, let it be *PageMaker*. This innovative package, born of Macintosh, started the whole trend. Its power and speed in creating one-of-a-kind and single-page documents more than offsets its unwieldy approach to long documents. Its simplicity and ease of use make *PageMaker* ideal for occasional jobs, too.

Finalist: Ventura Publisher 1.1

Ventura Publisher is in many ways more a complement than competitor to *Page-Maker*. Its great strength is long or repetitively formatted documents, where it puts the incredible power of style sheets to work. Boxes, line art, and shading can all be part of the style sheet, and you can flow entire documents without intervention. *Ventura Publisher* minds your text for you by maintaining your source document files even if you revise text during page layout. *Ventura Publisher* is also excellent in its management of figures, captions, chapters, and pages.

Winner: Publisher's Type Foundry

Publisher's Type Foundry is almost a completely new class of product: a professional tool for composing and modifying fonts for laser printing. At one level, it means that you needn't buy soft fonts for your laser printer anymore. More important, it allows you to modify existing fonts, whether you want to alter the entire alphabet or do something as simple as slashing a zero. At the highest level, it gives the professional an amazing, easy-to-use, intuitive set of techniques for creating new fonts. Typeface design is an incredibly subtle art; *Publisher's Type Foundry* is a major breakthrough for its practitioners.

DEVELOPMENT TOOLS

FINALISTS

Actor/The Whitewater Group
Chuck Duff

CodeView/Microsoft Corp.
Dave Neir

QuickBASIC 4.0/Microsoft Corp.

Tom Corbett
Len Oorthuys

Turbo C/Borland International
Brad Silverberg

Turbo Pascal 4.0/Borland International
David Intersimone

Great tools don't automatically make great programs, but they sure make program creation easier. In many ways, 1987 could be called the year of the compiler. Designers made tremendous strides in the areas that affect us most: ease of use, debugging, and optimization.

Finalist: Actor

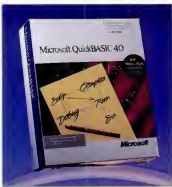
One of the unfortunate obstacles of programming in the powerful *Windows* environment is its complexity. Actor harnesses the power in a Smalltalk-like object-oriented language that reduces pages of code to a few succinct lines. After you've mastered the syntax and conceptual differences of object-oriented programming, you can do more with fewer lines of code in Actor than anywhere else. Actor is easily the highest-level language in use on PCs.

Finalist: CodeView

CodeView defines, for all intents and purposes, the state of the art in debugging. With it, programmers can dissect their own code, watch it execute, and track variables, loops, jumps, calls, and interactions with DOS. This latest version incorporates a built-in language interpreter that can evaluate either C, BASIC, FORTRAN, or Pascal expressions, so you can debug in the same high-level language you program in. Full support has been added for the external registers and special instructions of the 80386 processor, along with expanded memory. An 8087 emulator allows your program to be debugged on a machine with no coprocessor while displaying pseudo-8087 registers. A handful of new commands round out CodeView, making it perhaps the best debugger in its class.

Finalist: Turbo C

With C's widespread acceptance as a systems programming and application language, it was only a matter of time before Borland did a Turbo version of it. Turbo C has all the attributes you've come to expect from Borland products: integral editor, fast compilation, and small, efficient executable files. Coupled with the usual low Borland price, Turbo C is an excellent learning environment as well as a production tool.



Winner (tie): QuickBASIC 4.0

This year marks the second trip to the Technical Excellence podium for QuickBASIC. Last year we cited its editor, compiler, and debugger—the triad that made QuickBASIC 2 the full-featured programming language that it was. Microsoft has not rested on its laurels, however. This year QuickBASIC gained CodeView compatibility, unlimited variable size, and full interlanguage support, making it more of a professional language than ever. QuickBASIC 4.0 features immediate mode, latch variables, and the ability to resume compilation with or without changes. It's a true compiler that gives up none of the conveniences of an interpreter.

■ AWARDS FOR TECHNICAL EXCELLENCE



Winner (tie): Turbo Pascal 4.0

In the Awards for Technical Excellence, Turbo Pascal is another repeat winner. When we inaugurated the awards, we cited Philippe Kahn and Turbo Pascal for "single-handedly saving Pascal from oblivion." Turbo Pascal has improved dramatically in the newest version. It now offers such professional features as separate compilation and industry-standard linker formats. Borland has added the concept of units to the language so that modules can be separately compiled and linked. CodeView compatibility aids in debugging, and the Make utility maintains the most current version. And the compile speed has gone from merely fast to breathtaking.

GRAPHICS SOFTWARE

FINALISTS

AutoShade/Autodesk Inc.

Kern Sibbald
John Walker

Show Partner F/X/Brightbill-Roberts Inc.

Stephen Brightbill
Bill Fisher
Jim Lawyer
Mike Pooler
Ron Roberts

Graphics software is a dynamic market, changing nearly as quickly as we write about it. The changes, of course, are positive. Graphics products have picked up more power while becoming easier to use. As a result, PCs have muscled aside mainframes and workstations, while raising the productivity of all concerned.

Finalist: Show Partner F/X

Show Partner F/X ranks as the best of the slide-show programs; it's remarkably powerful and easy to use. In its current incarnation, *Show Partner F/X* has a wide array of special effects—wipes, pans, dissolves, and fades. It can mix virtually any graphic image with text screens while providing foolproof authoring tools for the creation, editing, and running of screen-based shows. *Show Partner F/X* makes the PC an effective demo/training/point-of-sale machine.



Winner: AutoShade

Autodesk's *AutoShade* is a magnificent add-on to *AutoCAD*, the world's most popular CAD program. It takes PC-based design into the third dimension with a shading and light-source control package that's easy and fun to use. Such power was long considered the sole province of high-end workstations; Autodesk's programmers have proved that good software engineering can bring full capability to a general-purpose platform like the PC. Further, they've broken through the barrier of technical complexity with a camerallike metaphor that makes the program intuitive to use and useful in simulations.

OPERATING ENVIRONMENTS

FINALISTS

DESQview 2.0/Quarterdeck Office Systems

Gary Pope

Microsoft Windows 2.0/Microsoft Corp.

Bob Mathews

Microsoft Windows/386/Microsoft Corp.

Phil Barrett

Mike Clark/Compaq Computer Corp.

Operating environments in 1987 had the highest furor factor of any product category. With the imminent release of OS/2, DOS-oriented environments were almost pushed into the background. The 80386 gave users and programmers alike a whole new set of opportunities, within and beyond traditional DOS boundaries.

Finalist: DESQview 2.0

DESQview has achieved wide fame as the best integrator of existing DOS applications. Quarterdeck was the first company to capitalize on the potential of both EEMS and the 80386, and *DESQview* was the first operating environment to window popular applications on a character-based screen, with custom drivers. *DESQview* 2.0 continues the trend with even better use of the 386's talents. It's easy to understand *DESQview*'s popularity: it's productive, useful, and fun.

■ AWARDS FOR TECHNICAL EXCELLENCE

Finalist: Microsoft Windows 2.0

The most-improved-where-it-counts-the-most award must surely go to *Windows 2.0*. While *Windows 1.0* certainly showed us the promised land of consolidated video and output device drivers, it left a lot to be desired in the speed department. It also had some user interface inconsistencies. Tiled windows, too, were not universally loved. *Windows 2.0* corrects all these flaws and has enough new features left over to make it a strong graphical platform for DOS. Along with *Windows/386* and the OS/2 Presentation Manager, it represents the look of the future for PCs.



Winner: Microsoft Windows/386

Microsoft Windows/386 is the operating environment that doesn't have to apologize for anything. It delivers everything that today's users want: multitasking, graphics, interprogram communications, and multiple windows. Further, since it runs existing *Windows* applications, pioneers are not left out in the cold. Best of all, it can run existing applications inside graphics windows (or give them the whole screen), and it gives each a full 640K of memory. *Windows/386* is an eloquent answer to the question, "What do I need an 80386 for?"

HARDWARE

FINALISTS

AT&T Vista Videographics Adapter/ AT&T Corp.

Carl Calabria
Bryan Hunt
Brad Pillow
Joe Shepard
Bill Stoddard

Emerald VAST/Emerald Systems Corp.

Hamid Assadian
Michael W. Harris
Bruce Martin

Kurzweil Discover 7320/Kurzweil Computer Products

Stephen Baum
Randall Stern
Michael Sussman

Zenith Perfect Monitor, Model ZCM- 1490/Zenith Data Systems

Bill Dougherty
Charles Prazak

Virtually all of the hardware products nominated this year have something special about them. New technologies abound. Faster and smarter are the order of the day. Indeed, the cleverness of engineers and designers seems to be boundless. The choices are tough, but the winners truly advance the state of the art.

Finalist: AT&T Vista Videographics Adapter

With its 1985 introduction of the TARGA line of boards, AT&T's Electronic Photography and Imaging Center broke new ground by bringing true-color video images to the PC. Last year, AT&T did it again with the Vista Videographics Adapter, a 32-bit graphics processor that is capable of displaying full-screen graphics in several high-resolution modes: 16 million colors at a resolution of 1K by 1K dots; 32,000 colors at 2K by 1K dots; and 256 colors at 2K by 2K dots. For such applications as video production, computer animation, and image processing, the AT&T Vista is a *sine qua non*.

Finalist: Emerald VAST

Helical scan recording, so common to video, has had a checkered history on computers. To date, the half-inch formats have made no appreciable dent in the backup market, largely because of the size of the external drive—often a modified VCR. Emerald's VAST mass storage device is a double breakthrough: it stores an incredible 2 gigabytes on a diminutive 8mm cartridge, and it fits in a 5½-inch form factor. The product bodes especially well for departmental computers and file servers, where disk storage is rapidly approaching a gigabyte.

Finalist: Kurzweil Discover 7320

Kurzweil was the first to break the \$40,000 barrier with a scanner/OCR that has high-end features and an affordable price. In fact, the Discover 7320 OCR performs best where most others are at their worst: on proportional type styles with a variety of fonts and sizes. At the same time, it's a serviceable graphics scanner.



Winner: Zenith Perfect Monitor, Model ZCM-1490

While all the attention has been focused on various flat-panel technologies, Zenith went back and reengineered the venerable cathode-ray tube. The result has a perfectly flat face, no glare, far better dot alignment, more brightness, and no distortion at the edges. The flat-tension-screen Perfect Monitor is a breakthrough where it counts most: superior ergonomics in the workplace.

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CIRCLE 368 ON READER SERVICE CARD

■ AWARDS FOR TECHNICAL EXCELLENCE

UTILITIES

FINALISTS

LIM expanded memory specification 4.0/Lotus Development Corp., Intel Corp., Microsoft Corp.

Bennett C. Baker/Lotus Development Corp.

Arnold Contreras/Lotus Development Corp.

Bill Krueger/Intel Corp.

David Wiese/Microsoft Corp.

Lap-Link/Travelling Software

Mark Eppley

Mark Robbins

Professional DeskMate/Tandy Corp.

Scott Cutler

WordPerfect Library/WordPerfect Corp.

Alan Ashton

Utility software products exist on the periphery of—and sometimes at the pleasure of—their mainstream companions. Yet we call on familiar utility programs every day to find misplaced files, buffer I/O, organize our hard disks, make us faster and more efficient, and keep us from the brink of disaster.

Finalist: Lap-Link

Travelling Software started as a small support house for the Radio Shack Model 100. Through experience in transferring files from the Model 100 to PCs came the idea for *Lap-Link*. The flood of laptops with 3½-inch drives created the market, and *Lap-Link* took the high ground as an easy-to-use, fast, and powerful transfer program. But its use hasn't been restricted to laptops. The advent of PS/2s in shops dominated by 5¼-inch drives created a need for Travelling Software's ready-made solution. *Lap-Link*'s real breakthrough is in user convenience. From the unusually complete cable and adapter set to the documentation to the simple yet powerful menu-driven program, *Lap-Link* breaks new ground.

Finalist: Professional DeskMate

Tandy salutes workgroup computing and individual productivity in a single product. *Professional DeskMate* is integrated software, a DOS shell, and local-area networking combined. The integrated portion has the features that most users need for casual calculations, quick notes, and telecommunications. The file manager organizes your hard disk and gives you quick access to your files and subdirectory. The piece that pulls it all together, however, is the local area network. While the RS-232 LAN is no barn-burner, it underscores the simple, straightforward usefulness of this product.

Finalist: WordPerfect Library

Not everyone may feel the need to add multitasking capabilities to their PCs, but enough people do to keep the market for terminate-and-stay-resident (TSR) programs alive and well. Such programs offer everything you could want in the way of desktop organizers. WordPerfect Corp.'s *WordPerfect Library*, a double-disk collection of desktop organizers built around the 40K *Shell* program, is among the best of the bunch. Supporting EMS and offering two editors, a calculator, a calendar, a file manager, a notebook, and a game called *Beast*, *WordPerfect Library* contains more features than most people will ever need, including at least one or two—well, maybe three—that most devotees couldn't live without.

Winner: LIM expanded memory specification 4.0

Expanded memory has more than proven its worth in the past 2 years. It has extended DOS's lifespan and utility and taken some of the heat off developers of advanced operating systems. But it has also lived under the cloud of a dual standard. LIM expanded memory specification 4.0 buries the hatchets and brings together the Lotus/Intel/Microsoft spec with the AST superset. It also gives programmers greatly enhanced power and flexibility. The ability to run programs from expanded memory is by itself an important technical breakthrough, but the big winner is DOS itself. Single users still want and need multiprocessing without the overhead of multitasking.

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Top companies according to the April 17, 1987 issue of *Business Week*.

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Eric Baelen
Manager, Business Systems
Development
General Electric Company



DESKTOP COMPUTERS

FINALISTS

Compaq Deskpro 386/20/Compaq Computer Corp.

Gary Stimac

IBM Personal System/2 Model 80/IBM Corp.

IBM Entry Systems Division's Boca Raton Lab

Desktop PCs are where the battles are won and lost every day. Power users place more demands on this class of hardware than on any other, and manufacturers get to strut their stuff here with their flagship machines. In this category, performance is everything.

Finalist: IBM Personal System/2 Model 80

The Model 80 can make a believer out of anyone who may have doubted the performance potential of the PS/2 line. This machine uses the Micro Channel in its full 32-bit glory. The entire machine is forward-thinking, right down to the design of the case. It provides ample room for 5¼-inch and 3½-inch drives, a big expansion bus, and sufficient on-board memory to make most users happy.



Winner: Compaq Deskpro 386/20

Compaq has staked out the high ground on the desktop. Rather than staying ahead of the competition, Compaq is working hard to stay ahead of itself. The Deskpro 386/20 is especially significant because it is the first commercial application of Intel's 82385 cache controller. Compaq also re-engineered the video card for this machine, making it the fastest EGA card available. Compaq runs the 80386 at 20 MHz and offers a Weitek 1167 floating-point processor. The results speak for themselves. This machine is almost inconceivably fast, yet it's fully compatible with today's hardware and software.

PORTABLE COMPUTERS

FINALISTS

Compaq Portable 386/Compaq Computer Corp.

Hugh Barnes

Jim Harris

Toshiba T1000/Toshiba America Inc.

Tetsuya Mizoguchi

Genzo Yamazaki

When portable computers first appeared, they were a surefire conversation starter. Now they're commonplace. But their performance and weight-to-computing power is anything but commonplace. Travel time is productive time, and portables help you keep a competitive edge.

Finalist: Toshiba T1000

The Toshiba T1000 has kindled the kind of user involvement that's been absent from laptop computers since the glow faded from Tandy's pioneering Model 100. Everyone loves the machine's size, weight, and features. At a shade over 6 pounds, there's always room for this lightweight. Toshiba correctly guessed that there would be a ready market for the machine that could hold the title as the lightest DOS portable and applied what it had learned from the T1100. The machine's popularity speaks for itself.



Winner: Compaq Portable 386

The Compaq Portable 386 is the hottest thing you can pick up with a handle. At 20 MHz, it outperforms everything else on the market but its deskbound sibling. Yet it's rugged enough for on-the-go computing, takes standard PC cards in an elegantly engineered snap-on expansion chassis, and weighs less than 20 pounds. Some folks may not like the styling, but everyone loves the way it performs.

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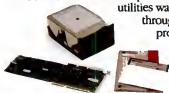
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CIRCLE 476 ON READER SERVICE CARD

■ AWARDS FOR TECHNICAL EXCELLENCE

CONNECTIVITY

FINALISTS

Alliance ZSL/Avatar Technologies Inc.

James Sturtevant

3Com 10Mb Twisted Pair/3Com Corp.

Paul Booth

Ron Crane

Skip Ely

TOPS/TOPS, a Sun Microsystems Co.

Gary Fitts

Nai Goldhaber

Michael Pflaumer

Gary Stroud

Finalist: Alliance ZSL

Typical of the data Private Branch Exchanges (PBXs) on the market but unique in its expandability is Avatar Technologies' Alliance ZSL. This PBX switch-and-software combination with up to 20 ports is designed to grow as your system grows; if you don't start out with the 20-port version, you can add 6-port expansion boards to the 8- and 14-port systems to bring them up to 20 ports. But expandability isn't the Alliance ZSL's only strong point: its excellent menu structure, ability to force peer-to-peer messages to the screen, and reporting capabilities make it an appealing network solution.

Finalist: TOPS

TOPS is the little network that could. Could beat the big ones at their own game. Could be the easiest to use on the market. Could merge PCs and Macs, complete with file conversion utilities. A lot of engineering goes into any network product. More and more, the kind of engineering that counts most is human engineering. TOPS obviously has worked hard on both kinds.

Winner: 3Com 10Mb Twisted Pair

Networking has many obstacles, not the least of which is wiring. 3Com's implementation of 10-megabit-per-second

twisted pair is the best solution yet. It uses only one pair of wires, doesn't require shielding, and can multidrop several machines from one twisted pair. The last feature is easily the most important. Wiring runs are often the most expensive, least considered, flexibility-limiting aspect of networking. Yet almost every in-house phone system can come up with an extra pair running to a critical location. The problems of running unshielded twisted pair this fast were long considered insurmountable. 3Com's engineers proved otherwise.

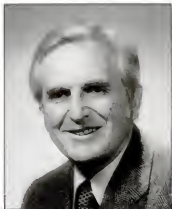
SPECIAL CATEGORY AWARD

Micro Channel architecture

Whether you consider the PS/2 a marketing triumph or the undermining of life as we know it, its underlying Micro Channel architecture remains a significant technical achievement. IBM has advanced the state of the art in every aspect of the bus: speed, reliability, self-configuration, electromagnetic interference, and future growth. The PS/2 line has not taken away from existing PC business as much as it has opened new

opportunities. IBM has dealt a new hand to the board manufacturers and, in so doing, created new markets for itself and others. It takes courage to scrap something that works well, to follow the technology into new, unproven ground. Much of the PS/2's continuing success will be due to Micro Channel architecture.

LIFETIME ACHIEVEMENT AWARD



Winner: Douglas Engelbart McDonnell Douglas Information Systems Group

Doug Engelbart's contribution to personal computing is almost inestimable. As the father of the mouse and one of the most insightful people on the human-to-computer interface, Engelbart has spent a lifetime advancing the state of the art. He invented the outline/idea processor and created the first windowed display, which later became the familiar PARC metaphor. This is the year IBM saw fit to put a mouse interface on the motherboard and standardize on a graphical user interface for its entire product line. Doug Engelbart, as pioneer and visionary, helped make it happen. □



For IBM's development of Micro Channel architecture, William C. Lowe, president of IBM's Entry Systems Division, accepted a special Technical Excellence Award.

Lynne Garusey, Judy Skidham, Ron Paley, Pamela G. ...
 Dean Huber, John Whalen, Eric Weinstein, Karl ...
 Terry Anderson, Jeffery Lampos, Thomas ...
 hman, Robert Lefeburk, Patricia ...
 Wayne Nicholls, Ruth ...
 d Grimaud, William Steven ...
 ah Kent, Keith Tolond, Michael S. M ...
 nn Shackelford, Geoffrey S. Perlma ...
 onald Morin, Darlene Lindholm, Paul ...
 Black, Vince Currier, Wayne Smith, ...
 upton, Steve Schrammel, Edwin G ...
 van R. Bronnier, Ginger Kaiser, Anne ...
 lites, Jean-Francois Cloutier, Nadear ...
 ones, Joe Hobbs, Wayne Brubaker, S ...
 he Pleier, Lynne Avery, Len Anderson ...
 Steve Forrester, Brian Trethewey, D ...
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 urch, Mark D. Sticht, Sue Ke ...
 rance W. Lewis, Bryan Lanman, Steve Madden, Paul Klotman, M. D., Carl Bonaventura, M. C. Clark, E. Auran ...
 James Johnson, Paul B. Godfrey, Marilyn Marchion, T.A. Miller, Chuck Snoon, Al Doortje, Anthony Gardin, F

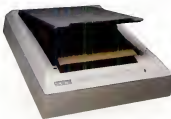
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FROM PORT TO PORT: NAVIGATING DATA TRANSFER

~~~~~

**N**ot everyone needs a local area network, fortunately, but many people need to move files between computers with incompatible disk formats—whether it's from a laptop to a desktop machine; from a PC, XT, or AT to a 1.44MB 3½-inch disk drive PS/2; or from a PC to a Macintosh. In fact, just about anyone who can't leave home without a laptop will at some point have to transfer files to a more powerful desktop computer, usually one that uses a 5¼-inch floppy disk drive rather than the 3½-inch drive that's standard on most portables; if that task is cumbersome, there goes some of the convenience of using the laptop in the first place.

But transferring files from machine to machine needn't be

*For users of laptops, Macs, or PS/2 machines,  
data transfer programs are inexpensive bridges to  
PCs, providing fast and proven methods  
for exchanging data between different media.*

## ■ DATA TRANSFER PROGRAMS

difficult—and it really is a small price to pay to have your data and travel with it too. Although the one way that works best is the one that suits your equipment and needs, you'll have to choose among the following basic options:

- Hardware,
- Combinations of hardware and software,
- Third-party transfer services,
- Electronic mail services.

Choosing to transfer files via hardware means installing an internal disk drive or hooking up an external disk drive—either a 3½-inch or 5¼-inch, depending on your configuration—and using DOS com-

mands to copy files and format disks. These products range in price from about \$150 for an internal 3½-inch drive to about \$550 for an external 3½-inch drive with its own power supply, and they are sold by such vendors as IBM, J&M Systems, Manzana Microsystems, Tigertronics, Toshiba America, and Zenith Data Systems. Or, for as much as \$8,500, you can get Shaffstall Corp.'s Shaffstall 6000, a chassis that houses one 8-inch, one 3½-inch, and two 5¼-inch disk drives and that is used for file transfers as well as format conversions. Format conversion software for the Shaffstall 6000 costs \$495 per package.

If you go the route of software and hardware, you have two choices. You can use a communications package, such as *Crosstalk XVI* and *Smartcom 3*, and a null modem that links the serial ports on both machines. Or you can use a device driver kit—the *Lap-Link* and *Brooklyn Bridge* genre—that includes cables for moving data from machine to machine. (For reviews of products in the aforementioned categories, see "The Technology of Transfer," *PC Magazine*, July 21, 1987).

Opting for the third-party transfer service method means you'll pay between \$10 and \$25 per disk to see your media shrink from 5¼ inches to 3½ inches. And

## DON'T ALL HOPE ABANDON, YE WHO TRANSFER

*Transferring files won't make your head spin in concentric circles, but it can be confusing. Here's what to look for if your efforts fail.*

If you try to use one of the file transfer programs reviewed in this article and have problems, be of good heart and have patience: each program will work eventually, although some are more difficult to configure than others. If you have problems, here are some things to check before abandoning hope or calling the vendor—whichever comes first.

**Tight cables.** Especially because some of these programs send signals back and forth at high speeds, connections are almost everything. Be sure the cables are connected securely, including snapping, wiring, or screwing them in tightly.

**Correct ports.** If you have more than one serial or parallel port, be sure that the right connection has been established on each computer. If you have an internal modem, the connection is often configured as COM1. In that case, be sure that the file transfer program knows it is connected to COM2. Some of the programs are smart enough to know how many communications ports your computers have and to test them; others need to be told precisely what's there and what they are hooked up to.

**Correct cables.** Unless you know for sure that a standard cable will work (such

is the case with the products using parallel cables) you probably should use the cable that comes with the program or, if available, buy any optional cable set provided by the vendor.

Unfortunately, lots of "standards" have exceptions, and serial cabling is one of the more bothersome. Even the RS-232 cable standard is not always the same. Many of the file transfer programs use a null modem cable—that is a serial cable with some wires crossed to fool the connected computers into thinking they're hooked up to a modem—but even null modem cables aren't always the same. Some use two wires, some three and others use up to nine wires to send signals. So, it makes more sense to go with the vendor cabling, even if it's more expensive.

**CONFIG.SYS file.** A few of the programs require changes to your computer's CONFIG.SYS file. If that's the case and you haven't done it, or if you changed the file but didn't reboot the computer, the program probably won't work.

You need to be sure to hook up the cables before trying to run the software. You must also be sure to run the pro-

grams in the order specified in the documentation. In some cases, the program needs to be started on the receiving computer first. In another case, the sending machine (which is referred to as the master) must be started first.

**Speed.** Speed is great, but accuracy is even more important. If the programs seem to connect but don't work, try stepping down the speed. This is especially a problem with the IBM PS/2 Model 80, which has a finicky UART chip that requires exact synchronization with the connected computer. In every case when testing serial cable file transfer programs with the Model 80, we had to step the speed down to 57 Kilobits per second to get it to work.

**Error trade-off.** If the program has a turbo mode, sometimes the faster speed is achieved by doing less error checking or by sending larger blocks of data at one time, both of which increase the chance of errors. Good programs should tell you when errors have occurred, and some of the programs tested will cancel the transfer if they detect too many errors. It doesn't hurt to check the files periodically to be sure they are being copied accurately.—Bruce Brown



using an electronic mail service, such as MCI Mail, means that you'll send files to yourself from one machine and receive them on a second machine that uses a different disk format. Of course, you'll need an e-mail account to do so.

**REVIEWS PLUS** In this article, we take a closer look at nine device driver/cable combinations—some newcomers and some that (in earlier versions) were reviewed in the July 27, 1987, issue. This time we're not just reviewing the products; instead we're going to show you how to make each one work, keystroke by keystroke. We've provided the roadmap that tells you how to hook up the cables and install each package, how to do a simple file transfer, and what the advanced features of the products can do.

We've also adopted some language conventions so that you can compare similar procedures used by dissimilar products. For example, when we refer to the two computers used to transfer files, we call the originating computer the source, sending, or origin computer. The computer to which you send the files is called the receiving or target computer or the destination. Some programs refer to the two machines as master and slave, but that does not necessarily imply file transfer in a particular direction. In other cases, whichever computer screen you're looking at is the local computer and the other is the remote machine. Drives A: and B: are always floppy disk drives. Drives C: and above can be either floppy or hard; therefore the usage is explained in each case.

Parallel and serial cables refer to standard IBM-compatible printer cables and RS-232C serial cables. All of the programs that use serial cables require either null modem adapters or serial null modem cables. If special cabling is used, that's mentioned, too.

In addition to copying files from floppy disks of one size to another size or format, all of the programs also transfer files between hard disk drives. None of the programs are copy protected, and none of the companies charge for support.

Of the nine programs that we tested, only one—*MacLinkPlus*—can exchange files between the PC and the Macintosh. For a description of other PC-to-Mac file

transfer alternatives, see Jim Seymour's sidebar "PC-to-Mac Data Transfers."

All of the programs worked as described, but not all are equally easy to install or configure or use. The best programs have both visually pleasing and simple menu modes, as well as more-advanced control modes, such as start-up parameters, macros, or command line systems. Read on to learn which roadmap will let your data travel the most direct route between two points.

## The Brooklyn Bridge

If anyone wants to sell you *The Brooklyn Bridge*, just make sure it's the \$129.95 package from White Crane Systems. If it is, you won't be getting a raw deal.

*The Brooklyn Bridge* won't get you from an outer borough to Manhattan, but it will let you take control of many devices on a remote computer. By adding lines to the master computer's CONFIG.SYS file, you set up one computer to access disk drives, printers, and plotters attached to a slave machine. Installation is a bit tricky, but once everything's working correctly, for example, a laptop can be set up to automatically access both physical and logical devices on a desktop computer.

*The Brooklyn Bridge* comes with a dou-

ble-headed null modem cable, with 9- and 25-wire connectors on each end. The usual 3½-inch and 5¼-inch floppy disks are included, as well as a good manual. The manual includes a quick-start section called "For the Impatient," followed by more-complete details on all aspects of installing and using *The Brooklyn Bridge*.

Most people use *The Brooklyn Bridge* to transfer files between computers, particularly between desktop PCs, XT's, AT's, and laptops, but you can also use the package to transfer files between those desktop machines and PS/2's. By configuring remote drives as devices of a local computer, a laptop, for example, can copy files to and from a desktop PC hard disk drive, or even access database files on the PC while running a database management program on the laptop.

In addition to transferring files, *The Brooklyn Bridge* can also install a remote printer port so that any print command issued on the laptop prints through the LPT1 port on the desktop computer. You can install physical and logical drives, serial and parallel ports, and a remote system clock/calendar, all as devices of the local computer. About the only device you cannot install is an external modem attached to the remote computer.

To use *The Brooklyn Bridge*, first connect the two computers with the included cable. Connect the cable to the first available serial port on each computer.

The next step is to add device-driver commands to the CONFIG.SYS file on the computer that will be running the session. Files can be sent both ways, but only one computer, called the master, gives the commands. The slave becomes passive, making its devices available to the master. If you have a CONFIG.SYS file in the root directory, you need to add the proper lines with Edlin or another editor. If you have no CONFIG.SYS file, you must create one. There has to be a Device line in the CONFIG.SYS file for each device on the slave computer that the master will access.

**INSTALLATION** The easiest way to install the program is to use the INSTALL.BAT file on the distribution disk. With the disk in drive A:, type INSTALL and the name of the disk in which you want the program installed (actually the disk in

**FACT FILE**



**The Brooklyn Bridge,**  
Version 1.41  
White Crane  
Systems Inc.  
6889 Peachtree  
Industrial Blvd.  
Norcross, GA 30092  
(404) 394-3119

List Price: \$129.95  
Requires: 64K RAM, one disk drive, one serial port on each machine, DOS 1.0 or later.  
In Short: *The Brooklyn Bridge* lets you access remote drives and other devices, such as printers, from a master computer. Installation and configuration are somewhat cumbersome, but the ability to share several types of devices between computers is very valuable. Not copy protected.

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## ■ DATA TRANSFER PROGRAMS

which the CONFIG.SYS is found when the computer boots up). With a hard disk drive system, the proper command is usually:

### INSTALL C:

If you have more than one serial port, the Installation program asks you which one to use, otherwise it automatically installs the program to use COM1 (unless there's no serial port at all, in which case it aborts). The installation procedure should be run on both computers.

If you are using the COM1 port, the line added to the CONFIG.SYS file is:

DEVICE = BRIDGE.DEV 1

This line makes up to two floppy disk drives and one hard disk drive on the slave machine accessible to the master. Other devices require specific lines that must be

added to the CONFIG.SYS file manually and are covered clearly in the manual.

All that running the installation program does is change the CONFIG.SYS file, but there are still two more steps to take before you can start using the slave computer's disk drives.

The next step is to issue the program command Bridge on the installed drive on the slave computer (or BridgeB if you're using COM2). This command puts the computer in slave mode, where it passively awaits access by the master computer until a Ctrl-Break is issued from the slave keyboard.

The last preparatory step is to reboot the master computer. Changes to CONFIG.SYS files don't take effect until the computer is restarted, which is cumbersome but that's the way DOS makes CONFIG.SYS work. When you reboot, the

master computer reads the new device commands, reads the devices available and, in the example case, assigns drive letters to the drives available on the slave machine and informs the user at the master computer's screen of the new drive designations.

For example, if you are running a PC-XT with one floppy disk drive and one hard disk drive as a slave and a dual-floppy-disk-drive laptop as the master, rebooting the laptop causes *The Brooklyn Bridge* to assign the drive designation C: to the XT floppy disk drive and D: to the XT hard drive. If you then ask for a directory of drive C: on the laptop, you see a directory listing of the slave computer (the XT) floppy disk drive.

Once *The Brooklyn Bridge* is installed and correctly configured, using remote devices on the slave from the master comput-



### Data Transfer Programs: Summary of Features

(Products listed in ascending price order)

|                                         | IBM PS/2<br>Data Migration<br>Facility Duoette | Direc-Link | File Shuttle | Paranet | The Brooklyn<br>Bridge | Fastwire II | Lap-Link | MacLink<br>Plus |
|-----------------------------------------|------------------------------------------------|------------|--------------|---------|------------------------|-------------|----------|-----------------|
|                                         | \$33.00                                        | \$49.95    | \$59.50      | \$99.95 | \$100.00               | \$129.95    | \$129.95 | \$195.00        |
| <b>GENERAL FEATURES</b>                 |                                                |            |              |         |                        |             |          |                 |
| <b>Media type provided:</b>             |                                                |            |              |         |                        |             |          |                 |
| 5 1/4-inch disk                         | ●                                              | ●          | ●            | ●       | ●                      | ●           | ●        | ●               |
| 3 1/2-inch disk                         | ○                                              | ●          | ●            | ●       | ●                      | ●           | ●        | ●               |
| <b>Serial null modem cable required</b> |                                                |            |              |         |                        |             |          |                 |
|                                         | ○                                              | ●          | ●            | ○       | ●                      | ●           | ●        | ●               |
| <b>Parallel cable required</b>          |                                                |            |              |         |                        |             |          |                 |
|                                         | ●                                              | ○          | ●            | ●       | ○                      | ○           | ○        | ○               |
| <b>Cabling provided</b>                 |                                                |            |              |         |                        |             |          |                 |
|                                         | ○                                              | ○          | Optional     | ○       | ●                      | ●           | ●        | ●               |
| <b>Compatibility:</b>                   |                                                |            |              |         |                        |             |          |                 |
| IBM PC-XT/AT                            | ●                                              | ●          | ●            | ●       | ●                      | ●           | ●        | ●               |
| IBM PS/2 line                           | ●                                              | ●          | ●            | ●       | ●                      | ●           | ●        | ●               |
| Macintosh line                          | ○                                              | ○          | ○            | ○       | ○                      | ○           | ○        | ●               |
| <b>Copy protected</b>                   |                                                |            |              |         |                        |             |          |                 |
|                                         | ○                                              | ○          | ○            | ○       | ○                      | ○           | ○        | ○               |
| <b>System requirements:</b>             |                                                |            |              |         |                        |             |          |                 |
| Memory                                  | 256K                                           | 64K        | 128K         | 256K    | 64K                    | 64K         | 256K     | 192K            |
| Disk drives                             | 1                                              | 1          | 1            | 1       | 1                      | 1           | 1        | 1               |
| Ports (serial or parallel)              | Parallel                                       | Serial     | Either       | Either  | Parallel               | Serial      | Serial   | Serial          |
| DOS version                             | 2.0 on PC,<br>3.3 on PS/2                      | 2.0        | 2.0          | 2.0     | 2.0                    | All         | 2.0      | 2.0             |
| Device driver                           | ○                                              | ○          | ○            | ○       | ●                      | ●           | ○        | ○               |

●—Yes ○—No \*Uses either serial or parallel cable

(continues)



# Data Transfer Programs: Summary of Features (continued)

(Products listed in ascending price order)

|                                            | IBM PS/2<br>Data Migra-<br>tion Facility | Duette  | Direct-Link | File Shuttle | Peranet  | The Brook:<br>lyn Bridge | Fastwire II | Lap-Link | MacLink<br>Plus |
|--------------------------------------------|------------------------------------------|---------|-------------|--------------|----------|--------------------------|-------------|----------|-----------------|
|                                            | \$33.00                                  | \$49.95 | \$59.50     | \$99.95      | \$100.00 | \$129.95                 | \$129.95    | \$129.95 | \$195.00        |
| <b>OPERATIONAL FEATURES</b>                |                                          |         |             |              |          |                          |             |          |                 |
| RAM resident                               | ○                                        | ○       | ○           | ○            | ○        | ○                        | ○           | ○        | ○               |
| Calls to DOS from within program           | N/A                                      | ○       | ●           | ●            | N/A      | N/A                      | ●           | ●        | ○               |
| Data compression                           | ○                                        | ○       | ○           | ○            | ○        | ○                        | ○           | ○        | ○               |
| Bidirectional control                      | ○                                        | ●       | ●           | ●            | ●        | ○                        | ●           | ●        | ○               |
| On-line help available                     | ○                                        | ●       | ●           | ●            | ○        | ●                        | ●           | ●        | ●               |
| Rated transfer speed in bps                | 75,000                                   | 115,200 | 115,200     | 115,200      | 166,000  | 115,200                  | 115,200     | 115,200  | 9,600           |
| Transfer speed (fixed or variable)         | Fixed                                    | Fixed   | Variable    | Fixed        | Fixed    | Variable                 | Fixed       | Variable | Fixed           |
| <b>Installation:</b>                       |                                          |         |             |              |          |                          |             |          |                 |
| Requires special install program           | ○                                        | ●       | ○           | ○            | ●        | ●                        | ●           | ○        | ●               |
| Software must be configured                | ○                                        | ○       | ○           | ○            | ●        | ●                        | ○           | ○        | ●               |
| Program runs from batch                    | ○                                        | ○       | ○           | ○            | ○        | ●                        | ○           | ○        | ○               |
| Program modifies AUTOEXEC.BAT              | ○                                        | ○       | ○           | ○            | ○        | ○                        | ○           | ○        | ○               |
| Program modifies CONFIG.SYS                | ○                                        | ○       | ○           | ○            | ●        | ●                        | ○           | ○        | ○               |
| <b>File selection by:</b>                  |                                          |         |             |              |          |                          |             |          |                 |
| Single file                                | ●                                        | ●       | ●           | ●            | ●        | ●                        | ●           | ●        | ●               |
| Date                                       | ○                                        | ○       | ●           | ●            | ○        | ○                        | ●           | ●        | ○               |
| Time                                       | ○                                        | ○       | ●           | ○            | ○        | ○                        | ●           | ○        | ○               |
| Wildcards                                  | ●                                        | ●       | ●           | ●            | ●        | ●                        | ●           | ●        | ○               |
| <b>File attributes:</b>                    |                                          |         |             |              |          |                          |             |          |                 |
| Read-only                                  | ○                                        | ○       | ●           | ○            | ○        | ○                        | ●           | ○        | ○               |
| System                                     | ○                                        | ○       | ○           | ○            | ○        | ○                        | ●           | ○        | ○               |
| Hidden                                     | ○                                        | ○       | ○           | ○            | ●        | ●                        | ●           | ●        | ○               |
| Archive                                    | ○                                        | ○       | ●           | ○            | ○        | ○                        | ●           | ○        | ○               |
| File tagging                               | ○                                        | ●       | ●           | ●            | ○        | ○                        | ●           | ●        | ●               |
| <b>Directory maintenance:</b>              |                                          |         |             |              |          |                          |             |          |                 |
| Makes directory                            | ○                                        | ●       | ●           | ○            | ○        | ○                        | ●           | ●        | ○               |
| Changes directory                          | ○                                        | ○       | ●           | ○            | ○        | ○                        | ●           | ●        | ○               |
| Removes directory                          | ○                                        | ○       | ●           | ○            | ○        | ○                        | ○           | ●        | ○               |
| Selects subdirectory                       | ○                                        | ●       | ●           | ●            | ○        | ●                        | ●           | ●        | ○               |
| <b>Program error control:</b>              |                                          |         |             |              |          |                          |             |          |                 |
| Checks destination for full disk           | ○                                        | ●       | ●           | ●            | ○        | ○                        | ○           | ●        | ●               |
| Checks destination for full root directory | ○                                        | ●       | ●           | ●            | ○        | ●                        | ●           | ●        | ●               |
| <b>Data transfer errors:</b>               |                                          |         |             |              |          |                          |             |          |                 |
| Locks up on errors                         | ○                                        | ●       | ○           | ○            | ○        | ○                        | ○           | ●        | ○               |
| Shows DOS error messages                   | ●                                        | ●       | ●           | ●            | ●        | ●                        | ●           | ●        | ●               |
| Checks for source disk                     | ●                                        | ●       | ●           | ●            | ●        | ●                        | ●           | ●        | ●               |
| Checks for target disk                     | ●                                        | ●       | ●           | ●            | ●        | ●                        | ●           | ●        | ●               |
| <b>Program-specific errors:</b>            |                                          |         |             |              |          |                          |             |          |                 |
| Shows errors                               | ●                                        | ●       | ●           | ●            | ○        | ●                        | ●           | ●        | ●               |
| Locks up on errors                         | ○                                        | ○       | ○           | ○            | ○        | ○                        | ○           | ○        | ○               |

●—Yes ○—No \*May run as shipped. N/A—Not applicable; runs from DOS level.

## ■ DATA TRANSFER PROGRAMS

White Crane Systems, Inc.  
BROOKLYN BRIDGE INSTALLATION PROGRAM

BROOKLYN BRIDGE will be installed on DRIVE c: for COM1:

Press Y to continue, N to Abort

Installation COMPLETED

After you have run INSTALL on both of your machines, you should choose one to be the slave machine, and one to be the master. On the slave, run the program BRIDGE (or BRIDGED if using COM2 on that machine). Then re-boot the master machine. The master machine will then have the new additional drive letters from the slave machine.

A:\>-

The Brooklyn Bridge's installation program displays the source drive and communications port that will be used for file transfer.

er is just like using normal drives or devices on the master itself. In the example above, the following command:

**COPY D:\DATA1.DAT B:**

would copy a file called DATA1.DAT from the slave XT hard disk drive to the laptop drive B:

**COPY COMMAND** You can do anything with the Copy command using the slave drives that you can with the drives actually attached to the master computer. To copy multiple files, use wildcards. Programs such as database management systems that can be directed to disk drives for data files can also use drives identified by *The Brooklyn Bridge*.

To use other slave computer devices you must add the Device command lines to the CONFIG.SYS file yourself. The manual includes several examples of device use and command lines.

Another common use of *The Brooklyn Bridge* is to redirect printer output from the parallel printer port on the master to the corresponding port on the slave. Putting the following line

**DEVICE=BRIDGE.DEV LPT1**

in the CONFIG.SYS file redirects the printer output to the slave printer port. Re-

member that any time you change the CONFIG.SYS file, you must reboot the master computer for the changes to work.

*The Brooklyn Bridge* is certainly an adequate performer in file transfer, but you have to look beyond the somewhat awkward installation and configuration scheme. Having to reboot the master computer with every change is irksome. Of course, if you always use the same setup, you need to change the CONFIG.SYS file only once.

*The Brooklyn Bridge* doesn't have many of the fancy features of some of the menu-driven file transfer programs, such as file tagging for batch transfer or copying by date range. You are limited to the normal tricks you can play with DOS. Not everyone wants or even likes menu-driven programs, however, and what *The Brooklyn Bridge* lacks in user interface, it makes up for in its ability to control more than just disk drives.

A minimally equipped laptop or desktop computer can use *The Brooklyn Bridge* to access multiple huge disk drives and printers on another computer. *The Brooklyn Bridge* is not a network system, as the manual warns. More than one computer cannot access the same drive; in fact, only one computer can really be used at a time. Moreover, drive access with *The Brooklyn*

*Bridge* is not as fast as with a true network. But for the more-simple and certainly more-common uses, such as file transfer, drive access, and printer access, *The Brooklyn Bridge* offers more control and flexibility than any of the other programs we tested.

## Direc-Link

*Direc-Link* is a \$59.50 customizable file-transfer program that works with either serial or parallel ports and cables. You can use an extremely easy visual tree structure to select the desired directory and then point and shoot to tag files for transfer. Or you can write Script Files to control the process. In either case, Micro-Z Co.'s *Direc-Link* is a powerful program.

*Direc-Link* comes with two disk formats, 3½-inch 720K and 5¼-inch 360K, as well as a clearly written manual. The package doesn't include cables, but you can buy one of two cable sets from Micro-Z. A serial cable set (\$32.50) includes a null modem cable with adapters for 9-pin and 25-pin heads. This null modem cable uses all nine wires, not just three as do many generic null modem cables. If you can make your own cable, do so. If not,

(continued)



## FACT FILE



**Direc-Link, Version 2**  
Micro-Z Co.  
4 Santa Bella Rd.  
Rolling Hills Estate, CA  
90274  
(213) 377-1640

List Price: \$59.50; serial  
cable set \$32.50; se-

rial/parallel cable set, \$45 plus shipping and handling.

Requires: 128K RAM, one disk drive, one

serial port or one parallel port on each machine, DOS 2.0 or later.

**In Short:** Direc-Link uses either serial or parallel ports to transfer files using a clear directory and file tree structure. You can run the program from either computer and can create Script Files to send often-transferred groups of files. Not copy protected.

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## DATA TRANSFER PROGRAMS

```

A1 .DAT A 387288 09-08-87
A2 .DAT A 1000 09-08-87
A3 .DAT A 1824 09-08-87
CTREE.MAP A 33 09-22-87

```

```

Change Name During Send :
==> BaTat.DaT 4
[Ctrl V]...Verify is Off [Ctrl P]...Send to printer
[Ctrl ←]...Auto-Process [Ctrl Q]...Quit Command LOCAL

```

When *Direct-Link* is loaded, it displays the directory structure (shown here) of the chosen drive, in this case drive D:. Once you've selected the files you want to send, you can change the filename, the verification of the transfer off or on, select autoprocessing for sending batches of files, the file to the printer instead of to another disk, or quit the process.

this one. However, the cable quality is as good as *Lap-Link*'s.

A serial/parallel kit (\$45) includes the A set plus an additional adapter to use a parallel printer cable. Because of the flexibility afforded by being able to use *Direct-Link* with both parallel and serial cables, it's probably a good idea to buy the combination cable set, which brings the cost of the entire package to \$104.50, still less than the \$129.95 price of three or four equally highly rated programs we tested.

To attach two computers with *Direct-Link*, first plug in the cable to the correct port. As with all cables used for data communications, it's a good idea to screw them in, depending on the type of connector. Lots of signals go back and forth during file transfer, and the chance of losing a few because of loose connections is worth the savings of the few seconds it takes to secure the cables.

The next step is to start *Direct-Link* on each computer. The command *DLINK* loads the program, first asking you which drive to display on the computer on which the program is running. You do this with each machine. *Direct-Link* then tries to connect with the other computer.

*Direct-Link* keeps trying to connect until successful, but you can interrupt the process to change the program configuration. If communication doesn't begin at first, select item 1 from the displayed 3-item menu to get the 24-item Customization screen. It's here that you can specify connection ports and bit-per-second rate, as well as screen characteristics, sorting options, menu display options, and display masks.

Once the two computers connect, you see a tree-like directory structure. This directory structure is saved in a file, by the way, and is created the first time you use a given drive. You never need to have *Direct-Link* rescans the drive unless you change its subdirectory structure. Use the cursor to move to the desired directory for sending or receiving files. At this point, you are ready to select files for transfer.

**HOW TO TRANSFER** On the sending computer, tap the F9 key to bring up a listing of the files in the chosen directory. Tag each file you want to copy by highlighting it with the cursor and then pressing either the plus key or the Spacebar. Once you've selected the files, press the Enter key to start transmission. You are then prompted

to change the name of each file before it is sent, and then you send it by pressing the Enter key again. You can override the name change prompt to send a batch of files by holding the Ctrl key and pressing Enter. While each file is transferring, a horizontal thermometer graphic tracks its progress.

The steps just described are *Direct-Link* at its simplest, which is logical, easy, and fairly fast. If you want more, however, *Direct-Link* can satisfy all but the most jaded. First of all, you can create, delete, and rename directories from within the program. Menu options also let you execute DOS commands or exit to DOS to execute non-DOS commands. In the latter case, *COMMAND.COM* must be available because it sets up DOS's alternate command processor. When you've finished issuing another command or even running another program, type EXIT at the DOS prompt to immediately return to *Direct-Link*.

If you execute DOS from within *Direct-Link*, 40K of RAM is still used by *Direct-Link*, so some memory is tied up. You can't really consider *Direct-Link* to be RAM resident, because even though it takes up space, you can't load it while you're in another program. You also shouldn't load any RAM-resident programs while executing DOS from within *Direct-Link* or you won't be able to get back into *Direct-Link* by typing EXIT at the DOS prompt.

You don't have to switch between keyboards while running *Direct-Link*. By pressing the ScrollLock key, you toggle a split-screen mode. That way commands for both computers can be entered from the keyboard where the ScrollLock was pressed. This facility is especially convenient if you can't see the second monitor without leaving your workstation.

In addition to file tagging, *Direct-Link* has many ways of selecting files for transfer. You can use wildcards to select files to be displayed and then quickly tag all displayed files. You can also sort files in a subdirectory by name, size, extension, or date of creation. You can transmit only the latest version of a file or tag all files changed since the last backup.

If file tagging or the customization options don't give you enough control over your file transfers, try *Direct-Link*'s Script

## A CABLE FOR ALL REASONS

Data transfer systems distinguish themselves from one another in ways other than their file transfer speeds or their ability (or inability) to process files in transit. The system you have your eye on may copy files at breakneck speed and allow files to be renamed during transfer, but if it requires a null modem cable and the manufacturer expects you to supply it, you'll have to be able to do so or you'll have to look elsewhere.

While some transfer packages accommodate both serial and parallel connections, others provide for one type only. As for connectors, some cables restrict you to 9-pin and 25-pin hookups, whereas others provide adaptors for 36-pin connections. Because of these variations, we present photos of the cables that are included in the systems reviewed in this issue, enabling you to examine them for their appropriateness to your data transfer needs.



*In good company: with 9-pin and 25-pin connectors at both ends, The Brooklyn Bridge's cable is similar to those of Fastwire II and Lap-Link.*



*Everything but the parallel cable: With Direc-Link come a serial cable and a 25-pin-to-36-pin parallel connector. To use the program in parallel mode, you must provide your own parallel cable.*



*Means versus ends: Like those of Fastwire II, Lap-Link, and The Brooklyn Bridge, Duette's serial cable offers both 9-pin and 25-pin connectivity, but in a connect-the-pins fashion. To change the cable's 25-pin connectors to 9-pin connectors, you must attach the 25-pin-to-9-pin adaptors to either one or both ends of the cable.*



*Like Lap-Link and The Brooklyn Bridge, Fastwire II comes with two connectors on each end of its serial cable, allowing you to link your computers via 9-pin or 25-pin connectors.*



*Working under the assumption that two cables are better than one, File Shuttle comes with both a 9-pin-to-9-pin serial cable and a 9-pin-to-25-pin serial cable. Can a 25-pin-to-25-pin cable be far behind?*



*A no-frills package, the IBM PS/2 Data Migration Facility does not include a cable. Instead, the program comes with two 25-pin-to-36-pin block connectors that you must attach to your own parallel cable.*



*Among the more sophisticated cabling solutions, Lap-Link's sturdy serial cable is equipped with both 9-pin and 25-pin connectors at each end.*



*Sui generis: for the special purpose of transferring data from the PC to the Mac, MacLinkPlus's serial cable has an 8-pin DIN connector for the Mac port and a 25-pin connector for the PC port.*



*One to a customer: Paraset's parallel cable comes with an additional connector known as the Paraset box. Although the package is not copy protected, it cannot be used unless the Paraset box is attached to the cable.*



## ■ DATA TRANSFER PROGRAMS

Files. Similar to DOS batch files, Script Files let you use a special command language to automate all of the normal *Direc-Link* functions, as well as do some special tricks, such as display custom messages on the screen and leave *Direc-Link*.

Once you have written a Script File, you can select it from within *Direc-Link* by pressing F1 when a directory file listing is displayed. You can also invoke a Script File with the DLINK start-up command, so you can run the program entirely from a DOS batch file. The combination of features in the Script Files is great for completely or relatively unattended file transfers between connected computers. These features also make *Direc-Link* an ideal product if you need to set up file transfer scripts that will later be run from DOS batch files by less-sophisticated users.

A powerful program, *Direc-Link* works well and gives you lots of control over file transfers between computers. The flexibility offered by the different control options makes it accessible to beginners but attractive to advanced users as well.

## Duette

Dollar and feature conscious? If that's the duet your budget is playing, then \$49.95 *Duette* is worth taking a look at. The least expensive of the menu-driven file transfer programs we tested, Platte River Associates' *Duette* can even handle file tagging, wildcards, and full directory transfers. *Duette* installs easily and uses the familiar horizontal command menu interface. You can also quickly switch sending and receiving computer roles without the cumbersome reconfiguring and bothersome rebooting some programs require—a duet some users would be very happy to avoid.

*Duette* has both types of disk, 3½ and 5¼ inches. No cable comes with the program, but *Duette* works with null modem cables with the grounds connected and the receive and transmit wires crossed (usually wires 2 and 3). A slim but attractive manual includes screen shots, a helpful difference from text-only manuals.

*Duette* is a good example of an application that doesn't try to be more than it has



*Duette's full-screen menu with file listings is easy to use. You select files by tapping the Spacebar, and then you send them to the receiving computer with the Send Files command.*

to. For the many users who don't need any functions other than simple file transfer, *Duette* starts up with little fuss or bother. No macros or fancy start-up parameters here, but most anyone who needs to transfer files can probably learn how to use the package in 10 minutes.

Hooking up *Duette* is a snap. Take a garden-variety null modem cable, plug the cable into COM1 or COM2 of two computers and then run the Install program on each computer. The installation program asks what kind of monitor you're using, which COM port to use, the transfer mode (speed), and in which directory you want to install the program. All of these settings can be changed from the configuration Main Menu option when the program is running, but a version of *Duette* must be installed before the program can be run.

Once you've hooked up and installed *Duette*, transferring files is simple. Start the program on both computers by typing *Duette*. On the receiving computer, choose Receive Files from the Main Menu to get to the Receive Menu. If you want to store the incoming files in a drive and directory other than the defaults, choose Directory and then enter the desired drive and

directory. You can also list the files in the specified directory if you want to see them before transferring other files to that directory. The last step on the receiving computer is to select Receive on the Receive Menu. A "Waiting" message flashes on the screen.

On the sending computer, which is



### FACT FILE



**Duette, Version 2.0**  
Platte River  
Associates Inc.,  
2000 W. 120th Ave.,  
#10  
Denver, CO 80234  
(800) 835-2246  
(ext. 333)

(303) 469-7765  
List Price: \$49.95  
Requires: 64K RAM, one serial port on each machine, DOS 2.0 or later.  
In Short: *Duette* is easy to install, configure, and use. It offers basic file transfer functions with tagging, wildcards, and full directory selection. A best buy. Not copy protected.  
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## ■ DATA TRANSFER PROGRAMS

storing the original files, select Send Files from the Main Menu to get to the Send Menu. Again, you can select a directory other than the default if you wish. You must then select Files to tell *Duette* what files to transfer. Select files individually with the Spacebar, choose all files in the directory by pressing the F2 key, or specify wildcards by pressing F10 to filter the files displayed. When you've selected the files, press the Enter key.

**LOGICAL COMMANDS** To actually send the files, you select Send Files from the Send Menu, tap the Spacebar or any key but Esc when you are ready, and the files are transferred one at a time. As you can tell, there are only a few commands to issue and those use generic terms. Don't expect to have to learn bizarre syntax or arcane terms. It all just makes sense.

There is also a File Commands option on the Main Menu that lets you change directories, list files, rename and erase files, display the number of bytes available on the current disk, and use the DOS TYPE command to display the contents of a given file on the screen. These commands let you perform the functions of most of the common DOS commands without having to leave *Duette*.

*Duette's* only limitation, other than the defined set of functions, is that you must work through menus to transfer files. There is no way to speed up the process with command lines or start-up parameters. That's just another way of saying that *Duette* doesn't do much that's fancy; it just transfers files from one computer to another in a fairly simple fashion.

*Duette* might not be the program for a power user, but it certainly makes sense for people who need to occasionally transfer files with a simple program. Leave others to set up unattended file transfers with a symphony of fancy features.

## Fastwire II

Although the II in Fastwire II refers to the current incarnation of this \$129.95 package, it might just as easily have been named *Fastwire III* for its three interface modes. If you need a product that has an

interface suitable for users with different levels of expertise, then *Fastwire II* bears scrutiny.

*Fastwire II*, from Rupp Brothers, comes with a 3½-inch and a 5¼-inch disk, a serial null modem cable with a 9-wire and 25-wire connector on each end to handle most computer serial port combinations, and no manual. There is a small pamphlet that briefly tells you how to attach the cable and start the program, but otherwise you're left with excellent on-line help screens.

If flexibility is a virtue, then this program may be a candidate for sainthood. The simplest way to use *Fastwire II* is in the point-and-shoot, split-screen mode. For repetitive, cyclical transfers, such as weekly backups, use the form mode to call up a transfer session with all parameters and options predetermined. The third method, *Fastwire II's* direct command mode, allows you to run the whole process from DOS.

To hook up two computers with *Fastwire II*, plug the cable included with the package into a serial port on each computer. You don't even have to be careful about which serial port you choose if you



## FACT FILE



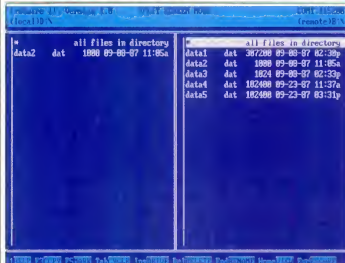
**Fastwire II**  
Rupp Brothers  
P.O. Drawer J,  
Lenox Hill Station  
New York, NY 10021  
(212) 517-7775  
List Price: \$129.95  
Requires: 256K RAM,  
one disk drive, one serial port on each machine, DOS 2.0 or later.

**In Short:** An extremely flexible file transfer program, *Fastwire II's* three operation modes make it appropriate for beginners, volume and repetitive process operators, and command-happy power users as well. Not copy protected.

CIRCLE #16 ON READER SERVICE CARD

have more than one. *Fastwire II* has a default Auto Serial Port mode that sends test signals to determine the designation of the port to which it is attached. If you want to, however, you can specify a particular COM port.

After connecting the computers, you have to decide which will be the "master"



Of the three command modes available in *Fastwire II*, the Split-Screen mode is the easiest to use, with local files listed on the left, remote files listed on the right, and the command menu displayed across the bottom of the screen.

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## ■ DATA TRANSFER PROGRAMS

and which the "slave." *Fastwire II* is run from the master computer, although files can be transferred in either direction. With the *Fastwire II* disk in the default drive of the master computer, type **INSTALL**. You are asked three questions about the type of computer and display screen that you're using. The install program is simple. At this point, you are ready to transfer files.

On the slave computer, put the *Fastwire II* disk in the default disk drive and type **SL**. This command tests the communications ports on the machine and establishes a waiting status. You can't use your computer for anything else until you exit *Fastwire II* on the slave machine by hitting the **Esc** key.

### ■ *Fastwire II*'s Form mode lets you store a set of transfer specifications as a named form.

Type **FW2** on the master computer, again with the *Fastwire II* program in the default drive. At this point, you can change the program configuration, with more options than are available in the install program. You can also select the *Fastwire II* control mode you want to use. The simplest is the Split Screen Mode.

The split screen lists files from the current drive and directory from the master computer on the left side of the screen and the corresponding information from the slave on the right side. The left and right cursor control keys switch a highlight cursor between sides of the screen.

To change the current directory of either computer, press the **Ins** key and type in the desired location. When the screen displays the file or files you want to transfer, position the cursor on each file in turn and tag it with the **F5** (Mark) key. After you have selected all desired files, press **F3** (Copy) to start the transfer process.

In addition to single file tagging, you can use wildcards to screen the files displayed and then mark all files for transfer. You can also configure the program to ex-

clude particular files, to compare dates and not copy an older file over a newer one of the same name, and to copy only those files created after a specified date and time. Another feature lets you specify whether or not to copy subdirectories.

**HELPFUL FORM MODE** If you want to get fancier, use *Fastwire II*'s Form mode. In this mode you can store a set of transfer specifications as a named form. This method is particularly helpful if you have one or more standard transfers that are repeated regularly. Rather than take the time to re-specify all the options and parameters each time you want to transfer files, you can just select the form by name and have it copy files automatically. This mode is of obvious benefit if the program is used by nervous beginners. The manager or computer-support person can preconfigure standard transfer forms, and everyone can relax a bit more.

If you resent menu systems because they are slow and cumbersome, and you don't want to use preset forms, either, maybe you'll like *Fastwire II*'s Command mode. With this method, you don't even have to start *Fastwire II* in the usual way on either computer. Different commands tell the computer to get ready to receive files, or to be the master and to follow certain parameter settings, which, incidentally, can include Form names if you're not too much of a purist. The following example gives a sense of the command mode:

```
>xm /d:12-15-85 /p /m c:\wp\*.ltr
```

This command starts with the DOS prompt **C>**. The command **xm** tells the computer to send files; **/d:12-15-85** specifies files created on or after December 15, 1985; **/p** calls for a prompt before each file is transferred; **/s** means create subdirectories as needed; and the file specification **c:\wp\\*.ltr** is the location and filename template for the files to be transferred. If the Command mode seems overwhelming, remember you have two other, easier modes to use.

*Fastwire II* was not the fastest transfer program tested, performing in about the mid-range of the serial cable transfer programs we evaluated. At \$129.95 it's also among the most expensive IBM-compatible-only file transfer programs, along with

*Lap-Link* and *The Brooklyn Bridge*.

*Fastwire II*'s help screen system is terrific, and a manual would need only to copy the information in the help screens. A printed manual could serve as an additional reference without requiring that you load the computer and move through the program to learn how to use it.

Its lack of a real manual, moderate speed, and high price notwithstanding, *Fastwire II* is a terrific program with a useful variety of operation modes.



## File Shuttle

If you're looking for high performance combined with a high-tech but easy-to-use user interface, try *File Shuttle*, a program from GetC Software that transfers files between computers using either parallel or serial ports. When configured to use the parallel ports, *File Shuttle* was one of the fastest programs we tested, living up to the lightning-fast speed suggested by its name. The space-shuttle allusion doesn't stop there, however; all the terminology used in the user interface is taken from the space-shuttle program, with outbound and inbound flights, cargo bays, and flight plans. Fortunately, though, you don't have to be a rocket scientist to use the program.

*File Shuttle* comes with 5¼-inch and



## FACT FILE



**File Shuttle,  
Version 3.10**  
GetC Software Inc.  
P.O. Box F110-182  
Blaine, WA 98230  
(800) 663-8066  
List Price: \$99.95

Requires: 256K RAM, one disk drive, one serial port or one parallel port on each machine, DOS 2.0 or later.  
**In Short:** *File Shuttle* is an extremely fast transfer program that can use either serial or parallel cables and ports. Its use of space-shuttle terminology may make the process clearer to novices but may sound tiresome to experienced users. Macros and start-up parameters add to the power of the program. Not copy protected.

CIRCLE 636 ON READER SERVICE CARD

## ■ DATA TRANSFER PROGRAMS

3½-inch disks, a short but clear manual, and a parallel cable connector adapter called the Rocket Socket.

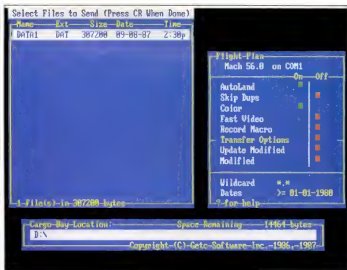
*File Shuttle*'s main purpose is file transfer, but you can get quite fancy in the process, including running the whole shebang from batch files with preset parameters and using Alt-key macros to control any or all of a file transfer session. You can tag single files or groups, use wildcards, select files by date ranges, and copy whole sub-directories.

Hooking up *File Shuttle* is easy; you just decide whether to use the parallel or serial method. For breakneck speed, use the parallel connection with the Rocket Socket. This method is clearly GetC Software's preference, too, since the program comes preconfigured for parallel operation using LPT1 on both computers.

If you prefer to use serial ports, you must obtain your own null modem cable. Since not all null modem configurations are the same, GetC Software includes the wiring scheme required. If you can and like to make your own cables, this part is a breeze. But if like most people you're at the mercy of what's available off the shelf, be warned that many generic null modem cables will not work. Do yourself a favor and use the parallel ports.

Once you've hooked up the two computers, you need to check the program configuration, called the Flight Plan. At all times the current Flight Plan is displayed in a box on the right side of the screen, with port, speed, and file transfer and selection options shown. If you need to make changes, select the Flight Plan menu by moving the highlight cursor horizontally and choosing the option with the Return key or by typing the first letter, F for Flight Plan. The options you will most likely change are Port (COM1, COM2, LPT1, LPT2), and if you are using a serial port, Velocity (115,200, 56,000, 38,400, 19,200, or 9,600 bits per second). You may also want to toggle on Autoland, which sets up the program to receive incoming files automatically.

After determining Port and Velocity, you need to select the Cargo Bay Location, which is *File Shuttle*'s way of referring to disk drives and directories. You must select Cargo Bay Locations separately for the sending and receiving computers so



*File Shuttle's file selection screen displays a great deal of information in three windows. The window on the left of the screen shows the files in the currently designated Cargo Bay, which in turn is identified in the window that runs across the bottom of the screen. The Flight Plan window on the right shows the current communications settings and file transfer options.*

that the program will know where to find files and where to put them.

**SHUTTLE FILES** With the preceding choices made or confirmed, *File Shuttle* is ready to shuttle files. Either computer can run the transfer. The first step in transferring files is to select In Bound on the main menu of the receiving computer. You then see the message "Wait for Incoming Files" on the computer's screen. When you choose Out Bound on the sending computer, you see a listing of normal file directory information.

The simplest way to select a file is to move the cursor to the file listing and press the F1 key. The selected file listing will then start to blink. You can then select other files or transfer the single selected file. Once you have selected all the files you want to transfer, press the Enter key. The file listing window disappears and a small window opens with the message "Confirm Launch" and a blinking cursor. To start the actual transfer, press the Enter key. A new window opens that displays the name of the file being transferred and a

running total of transferred bytes. If more than one file is transferred at a time, you also see a listing of the number of successful transfers.

In addition to transferring single files or tagging several for a group transfer, you can also transfer by date or by subdirectory, and you can set the program to transfer only those files that have been modified since the last transfer.

You can sort files by data, name, extension, or size for ease of tagging. Another useful feature is to have the program skip duplicate files.

One of *File Shuttle*'s distinguishing features is its macro learn mode. From anywhere in the Main Menu you can hold the Alt key and press R, enter a macro name, and then press whatever keys you wish to have saved for future use. Alt-S ends the macro-recording process and saves the macro file. Macros can later be rerun by pressing Alt-E and the macro filename or by including the macro name in a *File Shuttle* start-up parameter.

Start-up parameters are a useful way of preconfiguring *File Shuttle* at the DOS



## ■ DATA TRANSFER PROGRAMS

command level. All Flight Plan settings can be included in start-up parameters. This capability, combined with program macros, lets you use DOS batch files to run *File Shuttle* sessions unattended. The following example demonstrates the power of this program:

```
fn -1 -a -a2 -v115.2 -allback
```

The above command, typed or issued by a DOS batch file, starts *File Shuttle*, tells it to turn the color on, toggle on the auto-load feature, use the COM2 port at 115,200 bps, and run a macro called Allback. *File Shuttle*'s ability to use batch files and macros and to walk a user through the process with menus and ever-present on-line help screens makes it a reasonable choice for both experienced users and novices.

*File Shuttle* flies. The speed of parallel port file transfers is dependent to a large extent on processor speed, but in almost every case this program was the fastest of all we tested or was within a few tenths of a second of the fastest program. The most dramatic difference was transferring our test 300K file from an AT to a Model 80, in which *File Shuttle*'s 10.8-second average for three trials was about half the time of the next fastest program.

*File Shuttle* can't give you control of remote printers or let you access data on remote drives. Its purpose, which it fulfills admirably, is to transfer files from one computer to another, be it from a PC to a laptop or from a PC to a PS/2. *File Shuttle*'s only limitation is its space-shuttle terminology, which is meant to simplify the process for novices but may sound pretty foolish to power users who are fluent in DOS. But because you can always write macros to run the program, *File Shuttle* emerges from the dock as a clear winner.

### IBM PS/2 Data Migration Facility

The *IBM PS/2 Data Migration Facility*, from IBM Corp. is a low-end solution for a simple problem—transferring files from 5¼-inch floppy disks for PCs, XT's, and AT's to 3½-inch floppy disks for PS/2 machines. That is all the product does, al-

```
C:\>copy35 d:\data1.dat  
  
IBM Personal System/2  
Data Migration Facility  
(C) Copyright IBM Corp. 1987  
  
Sending file => d:\DATA1.DAT  
1 File(s) copied  
  
C:\>-
```

Once the IBM PS/2 Data Migration Facility is connected via parallel ports, the *RECV35.COM* program is run on the receiving computer. The *COPY35.COM* program on the sending computer is used just like the DOS *COPY* command, except that all files are copied to the current directory on the receiving computer. Shown here is the *COPY35* command.

though that certainly is enough for many users, especially since its \$33 price makes it the least expensive product reviewed here. But don't try to use the *Data Migration Facility* for anything else; it won't even transfer files the other way around, from 3½-inch to 5¼-inch disks.

The *Data Migration Facility* consists of a special connector and a 5¼-inch floppy disk. The disk contains a command file called *COPY35.COM* that is used by the sending computer, but this is only half of the software required to transfer files. The other required program, *RECV35.COM*, comes on the Reference Diskette included with DOS 3.3.

This product gives you an additional DOS command for the purpose of copying files from one size disk to another. You can also copy from and to hard disk drives. The *Data Migration Facility* uses a standard parallel printer cable with a special connector that plugs into the parallel printer port on the receiving computer.

All you have to do to run the program is plug the 2½- by 1½- by 2½-inch connector into the parallel port of the computer you want to send the files to, plug a parallel cable into the connector (the same end that is normally plugged into a printer), and the

hookup is complete. There is no software installation other than making sure the *COPY35.COM* and *RECV35.COM* command files are on the sending and receiving computers, respectively. Either put them



### FACT FILE



**IBM PS/2 Data Migration Facility, Version 1.0**  
IBM Corp.  
900 King St.  
Rye Brook, NY 10573  
For more information, contact an authorized

IBM PC, dealer or branch office.

List Price: \$33

Requires: 256K RAM; parallel printer port on each machine and a standard parallel cable; DOS 2.0 or later on the sending machine; DOS 3.3 on the receiving machine.

**In Short:** The *IBM PS/2 Data Migration Facility* is a single-purpose, inexpensive program that transfers data from PCs, XT's, and AT's to the newer PS/2 machines, but not from PS/2 back to PC, XT, or AT. This program is a bit awkward to hook up but is simple to use. Not copy protected.

CIRCLE 622 ON READER SERVICE CARD

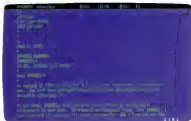
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June 8, 1989

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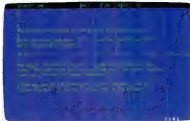
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## ■ DATA TRANSFER PROGRAMS

in the root directory or in a directory included in your start-up path for most convenient use.

Transferring a file is a two-step process. On the receiving computer, type RECV35 and press Enter. This step loads the program and puts the computer in transfer mode. On the sending computer, use the command COPY35 as you normally do. For example, COPY35 A:\data1.dat B: will copy a file called data1.dat on drive A: of the source computer to drive B: on the target computer. As soon as the transfer starts, the receiving computer displays a message that it is receiving the file. When the transfer has been completed, the screen reads "Transfer Complete", at which time you can transfer another file. And that's it—that's all you do.

The *Data Migration Facility* is as speedy as it is simple to use. Transferring our 300K test file took less than 26 seconds.

The *Data Migration Facility* supports wildcards but no fancy tagging or selection techniques. You use COPY35.COM just like you would COPY.COM, but with the advantage of using it to copy to the different size disks.

**MEMORY REQUIREMENT** In general, the *Data Migration Facility* uses DOS's normal error messages. The program does the same types of error checking and verification as DOS's COPY command. If something unusual happens, though, the COPY35.COM program displays a disconcerting "Invalid File or Pathname" message, which may be wrong. In testing, we discovered that the *Data Migration Facility* requires about 130K of memory in the sending machine after DOS is loaded. With any amount less than that, you cannot transfer files much larger than about 14K. With the extra memory available, there is no limit to the file transfer sizes other than disk capacity. However, this memory requirement is not documented in IBM's user manual, and since the error message you receive indicates a problem with the filename, you can spend a lot of unnecessary time trying to figure out what's wrong. We did.

You cannot use the *Data Migration Facility* to copy non-DOS files, copy-protected files, read-only files, or hidden files.

Files cannot be transferred to logical or RAM drives (although the source file can be in a RAM drive), nor can files be renamed during transfer.

If you have a mixture of old-format 5¼-inch floppy disks and PS/2 machines and you need a quick way of transferring your files, the *Data Migration Facility* may be just the ticket. But if you want to copy files in both directions or want more facilities, look elsewhere. (Many parallel ports, including those on pre-PS/2 IBMs, aren't bidirectional.) The perfect user for the *Data Migration Facility* is someone who has upgraded to a PS/2 machine and wants to copy all old format disks to the new format. Unplugging the printer and using the connector adapter is too inconvenient for daily use, but it isn't a big deal if you need to do it only once or only occasionally.

By making it easier to transfer files stored on 5¼-inch disks and to move huge files that would be cumbersome to transfer using the DOS BACKUP command, IBM has also made it easier for users to fall into step with its master plan: migration to the PS/2 line. The *IBM PS/2 Data Migration Facility* is an inexpensive way to hook up a PS/2 system with earlier-generation IBM PCs or compatibles to transfer data to the newer machine. The single-direction transfers, the awkwardness of the adapter connector, and the lack of capabilities found in some of the other available programs limits the market for this product to only those with simple needs. But then, IBM doesn't claim that the product does anything else.

### Lap-Link

If you want to start working immediately, Traveling Software's *Lap-Link* (\$129.95) may be the quickest and easiest file transfer program to set up and use. *Lap-Link* requires no special configuration or installation. All you do is attach the included cable, put a floppy disk in each of the connected computers, type LL, and you're ready to go.

*Lap-Link* includes a serial null modem cable with both 9-wire and 25-wire plugs on each end, both a 3½-inch and 5¼-inch

disk, and an excellent manual. It's a flexible file transfer program with lots of options. In addition to copying single files from one computer to another, you can tag groups of files for copying as well as select groups by wildcard or by subdirectory. There are options that ask the user for confirmation before overwriting files, to copy new files only, and to copy files created on a single date or within a range of dates. To make it easier to tag files, you can sort files within a subdirectory by name, extension, size, and date.

*Lap-Link* has several functions that are useful for just one computer. You can create, rename, or remove directories as well as rearrange the order of directories and subdirectories on a drive. In addition, *Lap-Link*'s Wildcopy command backs up files within a subdirectory by name, extension, size, and date. If it finds that you've run out of space, prompts you to insert a new floppy disk and picks up where it left off. *Lap-Link* has a turbo mode that does not change the actual transfer speed but increases the size of the blocks of information that are copied at a time. Turbo mode increases the likelihood of transmission errors, according to the vendor, but *Lap-Link* tests for correct transmission and resends bad blocks. In practice, I used the turbo mode during testing with no discernible problems.

To connect two computers with *Lap-Link*, plug the included cable into a serial



## FACT FILE



**Lap-Link, Version 2.05**  
Traveling Software Inc.  
N. Creek Corporate Center  
19310 N. Creek Pkwy.  
Boothell, WA 98011  
(800) 343-8080  
(206) 483-8088

List Price: \$129.95

Requires: 192K RAM, one disk drive, one serial port on each machine, DOS 2.0 or later.

**In Short:** A very fast file transfer program that is simple to install and use. *Lap-Link* can also be used to transfer files between drives and directories on the same computer. Not copy protected.

CIRCLE 816 ON READER SERVICE CARD

```
LAP-LINK (2.05) Copyright 1986, 87      Traveling Software Inc.      8816155
-----
Local Drive (D:) 219264 Free
DATA5 .DAT 102400 9-23-87 2:52p
[Empty File List]
E:\

Remote Drive (E:) 216864 Free
DATA1 .DAT 387200 9-08-87 2:38p
DATA2 .DAT 1000 9-08-87 11:05a
DATA3 .DAT 1024 9-08-87 2:33p
DATA4 .DAT 102400 9-23-87 11:37a
DATA5 .DAT 102400 9-23-87 3:37p

E:\

F COM1: 57600
COMMANDS: Help Log Free Copy Wildcopy Group Options View Erase Rename Box Quit
```

Lap-Link's split screen displays local disk drive files on the left side and remote disk drive files on the right. All operations are controlled by command menus displayed across the bottom of the screen.

port on each machine. Lap-Link works with either COM1 or COM2, and you don't have to specify which port you are using before you start the program. Once you attach the cable and start Lap-Link on both machines, press O on each machine to change the communication port setting and bit-per-second rate if necessary.

You can tell visually when Lap-Link is correctly attached and configured. The program keeps trying to connect once you start it, and when everything is right, a split screen shows file listings on each computer. In each case, the left side of the screen shows a listing of the local computer (itself) and the right side of the screen displays files from the remote computer. So the placement of the screens is reversed on the two computers.

The concepts of remote and local computers are used throughout Lap-Link. You can run the program from either keyboard, but whatever keyboard you are working on is considered the local computer, and the other one is the remote.

To copy a file, select the drive and directory in which the file is located, on either computer. All commands for Lap-Link are accessed through a horizontal command menu displayed at the bottom of the screen. Press the L key to "log" the

new drive and directory. If you want to change the destination drive and directory on the other computer, use the Log command there as well.

Once a desired source file is displayed, move the highlight cursor to the correct file and press the C key to copy the file. When the file has been copied, you are told if it is error-free. If the copy has errors, try copying it again, but turn off the turbo mode, or

## ■ To copy multiple files, Lap-Link's Group command allows you to tag all files in a subdirectory.

use a lower bps rate. Then you can proceed to the next transfer.

To do more than simple, single file transfers, you can move to either side of the screen and use the Wildcopy command to write a template, such as \*.DOC, to copy all files that match the template—in

this case, all files with the extension .DOC. Press the Enter key after writing the Wildcopy template, and copying begins.

**TAGGING FILES** Another way to copy multiple files is to use the Group command. Group allows you to tag individual files, to tag all files in a subdirectory, and to write a Wildtag template that tags all files that match the template. Tagging individual files is often made quicker by using one of the sort commands to display the files by name, extension, size, or date. Once you have selected all the files you want, press C to start the process.

When you transfer multiple files you can set Lap-Link's other options for copying from subdirectories, copying newer files only, confirming before overwriting files, and copying hidden files. All of these options are set with the Options menu. Once you've set the options the way you want them, you can save the changes for future sessions; otherwise those changes are in effect for the current session only. With a single copy of Lap-Link you cannot have more than one options-configuration combination at a time.

Whatever type of copying you do, Lap-Link is very fast. On most of our tests Lap-Link was the fastest program that used the serial port.

Lap-Link has a DOS command that lets you suspend Lap-Link and go to DOS for issuing DOS commands or running other programs using the DOS alternate command processor function. When you're done, go back to Lap-Link by issuing the command LL at the DOS prompt.

Lap-Link doesn't have special batch commands or start-up parameters that let you run the program straight from DOS. And although Lap-Link is easy, fast, and flexible, several of its competitors offer expert modes, macros, or command language syntax that let you avoid using menus and are better suited for setting up file transfer operations to be run by others who aren't as computer savvy.

Because Lap-Link can't be easily configured for others to use, except for saving the Options menu configuration, it is purely a user's program. It is, however, very fast, extremely simple to use, and one of the easiest programs of all the ones we tested to install and configure.

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Editor's Choice

February 16, 1987

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## MacLinkPlus

There's more than one way to move files from a PC to a Mac and vice versa, but using DataViz's *MacLinkPlus* is one of the most economical. (For other alternatives, see the accompanying sidebar "PC-to-Mac Data Transfers".) Both a file transfer program and a file translator, *MacLinkPlus* can copy files between computers, as well as automatically convert the contents of files into various data formats used by different application programs. The \$195 program also has a special communications mode that configures the Macintosh as a TTY terminal for communications with minicomputers and mainframes. Clearly, it's a mac-of-all-trades.

*MacLinkPlus* comes with a 3½-inch disk for the Macintosh and a 5¼-inch disk for the IBM PC, XT, or AT. There is also a null modem cable with a Macintosh connector on one end and a 25-pin serial connector on the other end for the IBM or compatible computer. If you're using an AT or laptop as the IBM-type computer, you'll also have to purchase a 25-pin-to-9-pin cable converter. The *MacLinkPlus* manual, replete with full screen shots, is comprehensive and clearly written.

To connect the Macintosh and PC directly, first plug in the cable to the respective communications ports. If you have more than one serial port on the IBM side,

### MacLink Plus (tm) (Version PC 1.1d) for the IBM PC

#### Initial Settings on the PC are:

P - Communications Serial Port: COM1  
C - Communications Connection Via: CABLE  
B - Communications Speed (baud): 9600  
R - Phone Rings before Answered: 0  
A - Security Password for Access: MACLINK

#### Command /selection (Use after Settings are Correct):

S - Save Settings to Batch File  
O - Go Online to connect with Macintosh

MacLink Plus (tm) is now waiting for contact from Macintosh

This message will change after MacLink Plus (tm) has connected

< Press Control-Break if you wish to EXIT MacLink Plus (tm) on the PC >

*Starting MacLinkPlus on the IBM computer consists of changing or confirming the communications settings and then pressing O to prepare the computer for access by the Macintosh.*

you can specify which port you are using when you load the IBM software. You can also use *MacLinkPlus* from remote locations using a Hayes-compatible modem with each computer.

Now you're ready to load *MacLinkPlus* on the IBM side. Put the *MacLinkPlus* disk in drive A:, make A: the default drive, and type MLPC. Press the Enter key to go past the copyright screen and review the communications settings. If your PC is going to be directly connected to a Macintosh, the recommended settings are 9,600 bits per second (the fastest available transfer rate), COM1, and Cable. Next, issue the command O to go Online and wait for a signal from the Macintosh.

*MacLinkPlus* is run from the Macintosh, and most of the installation and configuration settings are controlled from the Mac. Put the *MacLinkPlus* disk in the Macintosh disk drive and double-click the *MacLinkPlus* icon to start the program. Next, click the Cable to IBM PC icon to select more configuration options.

Once you've selected the cable connection, check the communications settings to be sure they match those on the PC. Be sure that the settings read Remote: IBM PC, Transfer Via: Direct (Cable), Speed: 9600, and Port: Phone.

Next, you must check the translators. If

you are just going to copy files, leave the translators for both sides on Binary, the common format in which all files are stored. In the Translators window, you can also switch the transfer direction to make either the Macintosh or the PC the source or the destination. Once you've chosen the appropriate translator settings, go on to the Select Files window.

The Select Files window splits the screen, showing a listing of the Mac's current directory on the left side and the PC's on the right. Here you must double click the Connect command to establish the connection between machines and then select the drive and directory for each computer, with the Drive command located under the respective file listing.

All that remains is to go to the desired directory of the source computer, as represented on the Macintosh screen, select the file or files to be transferred with a single click, and then double click the Convert and Transfer command. You are asked to confirm the filename for each file to be transferred, as well as the overwriting of a file if one already exists with the same name on the target drive.

**PAINFULLY SLOW TRANSFER** The next step is to cool your heels and wait; *MacLinkPlus*'s 9,600-bps transfer rate is



## FACT FILE



**MacLinkPlus**  
DataViz Inc.  
16 Winfield St.  
Norwalk, CT 06855  
(203) 866-4944  
List Price: \$195  
Requires: 128K RAM,  
Macintosh (any model,  
but must have 512K RAM), one disk drive,  
one serial port on each machine, DOS 2.1 or  
later on the IBM.

**In Short:** A file transfer and translator program used to directly connect Macintosh and IBM-compatible computers, *MacLinkPlus* can also be used with modems. Not copy protected.

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## PC-TO-MAC DATA TRANSFERS

*A choice of three techniques and a new set of tools will let you move your data from a PC to a Macintosh.*

Moving data from a PC to a Macintosh, or vice versa, isn't fundamentally different from PC-to-PC transfers. But you'll need a different set of tools, and you'll have to deal with file-format conversions more complicated than is usually required in the PC world.

Short of the simplicity of shipping data from machine to machine on a mixed-hardware local area network, you can transfer files from a PC to a Mac in three ways: through an electronic mail system, as messages; through direct-wire connections between PC and Mac; and through an add-on MS-DOS-format disk drive that's compatible with the Mac. The trick lies in deciding which answer best fits the complexity and frequency of your need to move information from one environment to the other.

The quickest and simplest way to transfer text from a PC to a Mac, or from a Mac to a PC, is to use an electronic mail system, such as MCI Mail, AT&T Mail, or The Source. To do this, you'll need an existing electronic-mail account, of course; and both the PC and the Mac must have communications software and modems (or at minimum, you'll have to move a single modem from one machine to the other between sessions). Just send the text to yourself, as an e-mail message, from one machine and then log off. Next, log on to the other machine and read (and save to disk) your data.

This kind of file transfer is hard to beat for simplicity and economy, but it can be a real nuisance with long text files full of complicated formatting instructions. When you save the file on the first machine, in a plain-ASCII form suitable for transmission through the packet-switching networks that connect you to e-mail systems, you'll lose most of your formatting, beyond paragraph breaks and tabs. Worse, you'll insert hard carriage returns

at the end of each line, not just the end of each paragraph.

When you download that file on the other computer and read it into your favorite word processor, you'll have to automatically or manually strip out all those line-ending CRs (without pulling out the CRs that separate paragraphs, lest your whole document collapse into one long string of indecipherable text), then restore any boldfacing, underlining, italics, super- and subscripts, overstrikes, and any other character attributes used in the original document. You'll also have to rejustify text for centered, flush-left, or flush-right lines; perhaps adjust margins and line lengths; and probably reset tab depths. Soft hyphens, cursor-drawn lines, and other exotica? Don't ask.

But you get the text from here to there quickly and easily. And even that kind of massive cleanup is better than having to rekey the text from scratch on the new system.

**DIRECT TRANSFER** The next level up from e-mail transfers is direct machine-to-machine transfers. You can accomplish this with almost any pair of standard communications programs—say, *Red Ryder* on the Mac and *PC File* on the PC—by connecting the two machines with a null modem cable. Don't let a computer dealer sock you with a big bill for making up that cable if it's not already in stock: a null modem cable is like any other serial cable designed to connect a PC to a modem, except that the wires to pins 2 and 3 are cross-connected at one end of the cable.

The null modem cable fools the first computer into thinking the second computer has "answered" the call through a modem. After that, the file transfer proceeds just as if you were connected to a BBS, on-line service, e-mail system, or

other modem-linked computer. A moderate-to-serious inconvenience with these simple machine-to-machine file transfers is the need to work from one computer's keyboard, then the other's, then back and forth between the two. When both machines are sitting side by side on your desk, that's not much of a problem. But if the Mac is on your desk and the PC is in the next room—and it's perfectly possible to do null modem transfers over serial cables of a hundred feet and longer—you'll walk your feet off "commuting" from one machine to the other.

Special PC-to-Mac file transfer programs make the job a lot easier and are well worth the cost if you'll be exchanging data very often. First, they're designed to handle the task with a lot less work. Second, they maximize the speed of transfers. Third, they allow you to handle the job from just one machine and keyboard, rather than running back and forth between the two machines. And fourth, they may handle complex file-format conversions as well, letting you move data from, say, *MultiMate* on the PC into *MacWrite* on the Macintosh. (Though it's important to note that some Mac programs, and a very few PC programs, already know how to read files from other programs on the other machine, once you get them onto the right physical media—for example, 800K 3½-inch floppies for the Macintosh.)

The first widely distributed PC-to-Mac file transfer program was *PC to Mac and Back*. But it has largely been supplanted by a later generation of superior products, the best of which is *DataViz's MacLinkPlus* (see the review for fact file information). Experienced PC and Mac users probably won't need to read beyond the first two pages of *MacLinkPlus's* excellent manual, which shows

the screens you'll see as you manage a transfer. The nearly intuitive quality of the program, drawn in large part from those excellent screens, however, masks a sophisticated and powerful utility.

DataViz includes a PC-to-Mac cable in the package with the 3½-inch (Macintosh) and 5¼-inch (PC) program disks. The standard DataViz cable connects from the 9-pin DIN phone (or printer) ports on the back of any Mac Plus, Mac SE, or Mac II to a PC's standard 25-pin male serial connector. (If you have an older Mac, which requires in place of a 9-pin DIN plug a 9-pin D-shell connector, DataViz will exchange your cable without charge.) If you're connecting to a PC AT or PC compatible that uses a 9-pin D-shell connector for its serial ports, you'll also need a short 9-pin-to-25-pin adapter cable, available from most dealers.

**EASY TO USE** Using *MacLinkPlus* couldn't be simpler. Connect the two machines with the cable provided (or, if you're a masochist, connect the machines through modems, also supported by the program). Bring up *MacLinkPlus* on the PC, then go to the Mac, from which you'll control the entire session. Bring up *MacLinkPlus* on the Mac. You'll see a screen with separate windows for the files stored on both machines. Indicate which way—that is, from and to which machines—you want to move data. If you want to do a file-format conversion on the fly during the transfer, click on the Select Translators button and then click on the formats of the source and target files; the choices appear in the two windows.

Click the Connect button, select the files on the respective machines, and click Connect. Bingo: the file is moved and converted (for a more detailed roadmap, see the review of *MacLinkPlus*). *MacLinkPlus* shows you only those files on the PC with the appropriate filename extensions (for example, .DOCs for *MultiMate* files, .WKS for 1-2-3 spreadsheets, and so on); you come up in the default directory but can move among disk drives and subdirectories by pointing and

clicking. At the Mac end, *MacLinkPlus* supports Apple's HFS (Hierarchical File System), so you can move among folders and drives the same way. *MacLinkPlus* even tallies on-screen possible errors during the translation process and writes an error-log file you can check later.

If you don't want to do the file conversion during transfer—or if your Mac is connected to a network and you're transferring a file from the net server, a routine also supported by *MacLinkPlus*—you can do translations in local mode, later, as a separate operation.

The current version of *MacLinkPlus* (1.1e) supports the following formats on the Mac side in translations: pure binary, Mac binary, comma-separated and tab-separated variables (for database records), .DIF, *Microsoft Excel*, *Jazz*, *MacWrite*, *Multiplan*, *PageMaker* 2.0, tab text, and *Microsoft Word*. On the PC side you'll find: pure binary, Mac binary, comma-separated and tab-separated variables, *dBASE II* and *dBASE III*, .DIF, 1-2-3, *MultiMate*, *Multiplan*, *PageMaker* (PC), *Symphony*, ASCII text, tab text, *Microsoft Word*, *WordStar*, and DCA (IBM's Document Content Architecture, which thus brings in a flock of additional programs that can save DCA-format files, including *WordPerfect*, *Sanna*, *DisplayWrite*, *PFS:Professional Write*, and others).

**HARDWARE METHOD** The final, and most convenient, elegant, and expensive way of shipping files back and forth is through an external disk drive. Two MS-DOS-compatible external add-on floppy disk drives are available for the Macintosh, from Apple and Dayna Communications; no Mac-compatible add-on drives for PCs have yet appeared.

Apple's \$395 add-on 5¼-inch MS-DOS drive is a relatively primitive affair, but the \$795 DaynaFile, from Salt Lake City-based Dayna Communications, is a remarkable and versatile device, well suited to bidirectional file transfers on a regular basis. The DaynaFile (see *PC Magazine*, November 24, 1987, for a more complete description) is a two-

disk-drive-bay external add-on for Macs, connected through the SCSI port of Mac 512Es, Pluses, SEs, and IIs. It accepts up to two disk drives in any combination of the four IBM PC-supported floppy disk formats: 5¼-inch 360K and 1.2MB, 3½-inch 720K and 1.44MB.

Once connected to the Mac, the DaynaFile appears on the Mac's "desktop" screen as just another drive. MS-DOS files on PC-written floppy disks appear as little Mac icons, and can be moved to the Mac's own 3½-inch floppy disks—or likelier, to the Mac's hard disk—with a couple of mouse clicks. Similarly, Mac-originated files can be written to a PC-format floppy disk in either of the DaynaFile's drives; when that floppy disk is loaded into an MS-DOS PC's disk drives, the Mac files appear with standard DOS filenames, in DOS file format. (Longer filenames are, of course, truncated to the usual eight-character-plus-three-character-extension DOS convention.)

Conversion software provided by Dayna with the unit handles a few file format conversions, including *WordStar* and *MultiMate* on the PC to and from *MacWrite* and *Mac Word 1.05*, and *Multiplan* (MAC) to and from *Multiplan* (PC) and 1-2-3. Remember that because some programs can already read other programs' file formats, that short list may well be sufficient.

Which answer is for you? If you only occasionally need to move files from the Mac to the PC or the other way around, and you're transferring relatively short text-only files, e-mail systems are hard to beat. If you want to ship files from machine to machine fairly frequently, and/or need to move data from one program's native file format to that of another, *MacLinkPlus* is an easy, economical answer. And if you expect to need frequent machine-to-machine transfers and conversions, in what I'd call a production setting, the DaynaFile is the answer.—Jim Seymour

*Jim Seymour is a contributing editor of PC Magazine.*

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CIRCLE 378 ON READER SERVICE CARD

## ■ DATA TRANSFER PROGRAMS

deadly slow. While the transfer is taking place, the screen displays a byte counter for your edification.

The most common use for *MacLink-Plus* is file transfer, but the file translator function is a great feature as well, since getting raw data into a form usable by various application programs, such as word processors and spreadsheets is often complicated and sometimes impossible. To translate between file formats, select the translate mode on each side of the display screen, tag the files to be translated, and finally issue the Convert and Transfer command.

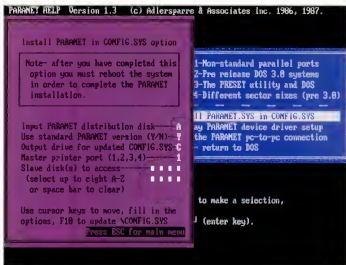
Compared with the other programs reviewed here, *MacLinkPlus* is very slow when used with directly connected computers. It also doesn't have all the fancy file-selection capabilities that many PC-only programs have. But then again none of those other packages are designed to swap files between PCs and Macs—an increasingly common need.

## Paranet

*Paranet*, from Comtek Data Systems, is a software-and-cabling combination that uses parallel ports to access one or more disk drives on one computer from another computer, whether it is between a PC and a laptop or between a PC and a PS/2. The product consists of a 5¼-inch disk, a 3½-inch disk, and a 25-pin cable with a special adapter on one end. In addition to using *Paranet* for transferring files between 3½-inch and 5¼-inch floppy disk formats, you can also use it to back up hard disk drives, access large files, copy files between hard disk drives, and execute programs residing on another computer.

*Paranet*'s name implies that you are setting up a network using parallel printer ports. That's something of an overstatement, but *Paranet* does give you ready access to remote disk drives.

To use *Paranet*, you must attach the 25-pin cable and set up a device driver on the main computer (called the "master") for each drive to be accessed on the remote machine (the "slave"). To hook up two computers, simply plug in the cable to a printer port on each machine. If either



*Paranet's two-window help menu allows you to change your hardware configuration.*

computer has more than one printer port, it is assumed that you will connect the *Paranet* cable to LPT1 (the usual designation for the first or single printer port), but other printer ports are usable, as long as you tell the software about them. If you are going to use *Paranet* a lot, it would be worth the expense to add an extra parallel port to each computer if they currently have only one port; that way you won't have to unplug your printers every time you want to use *Paranet*.

**MASTERORSLAVE** Once the computers are connected, you need to decide which machine is going to be the master and which is to be the slave. The difference is easy to determine: the master computer is the one that is going to use or retrieve information that resides on another machine. That other machine, which has files or programs you want to access, is therefore the slave.

The master can access both physical or logical (RAM) drives on the slave computer. The only limitation to the number of drives accessible is the master computer's memory. Each drive on the slave that is identified by the master needs a separate device driver in the CONFIG.SYS file in

the master's root directory, and each driver takes 3K of memory.

To write a device driver for a slave drive, edit the master's CONFIG.SYS file (or create one if none exists) with the following line syntax for each slave drive:

DEVICE = PARANET.SYS -CDN



## FACT FILE



**Paranet, Version 1.3**  
Comtek Data  
Systems Ltd.  
280 Albert St., #701  
Ottawa, Ontario  
K1P 5G8  
Canada  
(613) 236-1487

List Price: \$100

Requires: 64K RAM, one disk drive, one parallel port on each machine, DOS 2.0 or later.

**In Short:** *Paranet* uses parallel ports to connect computers for file transfer and most other DOS activities, using standard DOS command syntax. It works well, but installation can be a bit tricky. Not copy protected.

CIRCLE 621 ON READER SERVICE CARD



In the above line, everything through the hyphen is required. The letters CDN are variables. C specifies the type of computer you are using (the default is I for IBM compatible—the only type currently usable). D identifies the drive letter on the slave computer (if you're accessing the slave computer's floppy drive B:, for example, then use the letter B). N is used only if the parallel port used is something other than LPT1; acceptable numbers are 1 through 4. A typical master computer CONFIG.SYS file device driver would read:

```
DEVICE = PARANET.SYS -IC1
```

The line above specifies the slave drive as being on an IBM-compatible computer (I), called drive C: on the slave (C), and the cable is hooked up to the master computer's parallel printer port LPT1 (1).

After the master computer's CONFIG.SYS file has been created or changed, reboot the computer to have the new driver(s) take effect. This step is essential but often overlooked. Just rewriting the CONFIG.SYS file is not enough; you must reboot the machine.

When you reboot the master computer, you are told how to refer to the drives on the slave machine when accessing them from the master. *Paranet* assigns drive letter names in sequence to the slave drives, starting after the last physical or logical drive on the master computer. For example, if you have a floppy disk drive A: and hard disk drive C: on the master, the first slave drive is called D:. If the master has floppy disk drive A:, hard disk drives C: and D:, and RAM disk drives E:, F:, and G:, then the slave drives start with H:. Remember that you can have several drives on the slave system, limited by memory space for device drivers on the master and the limitations of DOS as to the number of drives it can pay attention to.

When the master computer is restarted with the proper CONFIG.SYS file, it's then time to install the *Paranet* software on the slave computer. The command syntax for this process is:

```
PSLAVE -CN
```

In this case C also identifies the type of master computer (the only acceptable response is I, which is the default). N refers

to the slave's printer port 1 through 4 (as with the master, 1 is the default). The command for the default setup then is:

```
PSLAVE -I1
```

If you are using the default values, however, all you have to do is enter:

```
PSLAVE
```

Now you're ready to go. If it all seems confusing, there are two ways to simplify the process. The *Paranet* disk includes a program called Help that walks you through the installation process by asking questions. The Help program also will display installed *Paranet* device drivers and test the connection between the parallel connectors. A second way to make the process easier is to write batch files for each computer that installs the proper files.

## ■ In *Paranet*, file transfers are simple once three conditions are satisfied.

Either computer can be master or slave. As long as the correct drivers are in each machine's CONFIG.SYS file, the master-and-slave relationship is determined by which machine runs the PSLAVE program.

**THREE CONDITIONS** File transfers are simple once three conditions are satisfied: the two computers must be connected with the special cable and adapter; the master machine must be booted with the proper CONFIG.SYS device drivers; and the program PSLAVE is run on the slave computer.

To access a slave drive, simply issue normal DOS commands. The only commands that don't work are those that require a real, connected disk drive, such as FORMAT and DISKCOPY.

To copy a file called LETTER.TXT on your master computer's hard disk drive C: to a slave floppy disk drive called D: (remember that the slave itself may think the

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## ■ DATA TRANSFER PROGRAMS

drive is called A:, but here we care only about what the master thinks), the command is:

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computers, *Paranet* can also be used with other DOS commands and by other software that recognizes variable data drive identifiers. You can't tag files for batch transfer, but DOS wildcard conventions work. You can also run a database program on the master and access data files on the slave, an especially helpful facility if you want to use a laptop with a desktop computer's hard disk drive. Also, *Paranet* can be used when your computers don't both have serial ports, or if the serial ports must be hooked up for other reasons.

*Paranet* turned in some of the fastest file transfer speeds of all the programs we tested. The only slow speed transfer was when sending a 300K file from the AT to the laptop.

*Paranet's* limitations are a potentially confusing installation process and its inability to do more than DOS does. There is no file tagging, no target drive space checking, and no date and time filtering.

*Paranet* makes particular sense if you need to do more than just transfer files, which can be done with programs that are less expensive and easier to install. If you want the additional ability to access remote drives for other purposes, *Paranet* bears consideration.

*Bruce Brown is a principal at Soft Industries, a Connecticut-based computer consultancy, and a frequent contributor to PC Magazine.*

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# THE GREAT COMMUNICATORS FACE OFF

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**C**ommunications programs have changed little since the early days of the PC—until recently. Back then, *PC-Talk III* established a low-end standard, while *Crosstalk XVI* and a few other full-function programs represented the high end. Both types of programs offered essentially the same ability to send and receive files, but low-end programs forced someone to be at the keyboard during communications sessions, whereas high-end programs could automate transfers. Many other programs offered noteworthy features for special needs, and not all programs were easy to use. But if you needed more than *PC-Talk III* and you didn't have unusual requirements, you wouldn't have found much difference in capability from one full-functioned communications program to the next.

In the last year or so, all that has changed. As the five pro-

*PC Magazine evaluates the creme de la creme of  
the new generation of communications  
packages: Crosstalk Mk.4, HyperAccess, PC-Talk4,  
ProComm, and Smartcom III.*

## ■ COMMUNICATIONS PROGRAMS

grams reviewed here—*Crosstalk Mk.4*, *HyperAccess*, *PC-Talk4*, *ProComm*, and *Smartcom III*—demonstrate, more differences now exist between the low end and the high end. If you're using your current communications program primarily out of habit, it's definitely time to take another look at what's available.

### ERROR-CHECKING PROTOCOLS

As most computer users know by now, error-checking protocols are essential when transferring files by phone. Phone lines can be noisy, and modems can misinterpret that noise as data. If you're only sending text, a few errors won't usually do much harm, although searching for them can be an inconvenience. You can use an ASCII SEND command, which reads the file from disk and sends the ASCII characters out the com port much as if you'd typed them at the keyboard.

But in a binary file, even a single error can be disastrous. Fortunately, error-checking protocols—a set of rules to acknowledge receipt of data or to ask for data to be resent—are there to check the accuracy of transmissions. The sending computer calculates the data and sends the result along with the data itself. The receiving computer performs the same calculation and compares its answer with the result sent by the sender. If the answers match, the receiving computer assumes it received the data correctly, and it sends an acknowledgment to the sender. If the answers don't match, the receiving computer asks the sending computer to retransmit.

Beyond this brief description, error-checking protocols vary in every imaginable way—beginning with the calculation used to check for accuracy. In fact, many error-checking protocols are available. Most of them are proprietary and will work only if the same program is running on both sides of the link. Obviously, if you want to transfer files between machines running programs from different vendors, you're out of luck.

However, there are several public domain error-checking protocols which allow any program that uses one of them to exchange files with any other program that uses the same one. Of these, Xmodem and Kermit are of particular interest. Xmodem has been important in PC-based communi-



## Communications Programs: Summary of Features

(Products listed in ascending price order)

|                                                 | ProComm<br>\$50                                                                                                                                           | PC-Talk4<br>\$99                                                                                                                                          | HyperAccess<br>\$149                                                                 | Crosstalk<br>Mk.4<br>\$245                                                                                                               | Smartcom III<br>\$249                                                                                                      |
|-------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------|
| <b>DIALING AND LOG-ON FEATURES</b>              |                                                                                                                                                           |                                                                                                                                                           |                                                                                      |                                                                                                                                          |                                                                                                                            |
| Manual dial                                     | ●                                                                                                                                                         | ●                                                                                                                                                         | ●                                                                                    | ●                                                                                                                                        | ●                                                                                                                          |
| Talks to modem from keyboard                    | ●                                                                                                                                                         | ●                                                                                                                                                         | ●                                                                                    | ●                                                                                                                                        | ●                                                                                                                          |
| Fully automated auto-dial/<br>auto-log-on       | ●                                                                                                                                                         | ●                                                                                                                                                         | ●                                                                                    | ●                                                                                                                                        | ●                                                                                                                          |
| Stores password for on-line<br>system           | ●                                                                                                                                                         | ●                                                                                                                                                         | ●                                                                                    | ●                                                                                                                                        | ●                                                                                                                          |
| Maximum number of repeat dials                  | Unlimited                                                                                                                                                 | Unlimited                                                                                                                                                 | 20                                                                                   | 255                                                                                                                                      | 100                                                                                                                        |
| Exits to DOS without breaking<br>communications | ●                                                                                                                                                         | ●                                                                                                                                                         | ●                                                                                    | ●                                                                                                                                        | ●                                                                                                                          |
| DOS functions included                          | ●                                                                                                                                                         | ●                                                                                                                                                         | ●                                                                                    | ●                                                                                                                                        | ●                                                                                                                          |
| Built-in text editor                            | ○                                                                                                                                                         | ○                                                                                                                                                         | ○                                                                                    | ●                                                                                                                                        | ●                                                                                                                          |
| Can designate any editor                        | ●                                                                                                                                                         | ○                                                                                                                                                         | ●                                                                                    | ○                                                                                                                                        | ○                                                                                                                          |
| Transfer rate (bps)                             | 300-19,000                                                                                                                                                | 300-9,600                                                                                                                                                 | 50-57,600                                                                            | 110-115,200                                                                                                                              | 110-115,200                                                                                                                |
| <b>Echoplex:</b>                                |                                                                                                                                                           |                                                                                                                                                           |                                                                                      |                                                                                                                                          |                                                                                                                            |
| Local                                           | ●                                                                                                                                                         | ●                                                                                                                                                         | ●                                                                                    | ●                                                                                                                                        | ●                                                                                                                          |
| Remote                                          | ○                                                                                                                                                         | ○                                                                                                                                                         | ●                                                                                    | ●                                                                                                                                        | ●                                                                                                                          |
| Turnaround character                            | ●                                                                                                                                                         | ●                                                                                                                                                         | ●                                                                                    | ●                                                                                                                                        | ○                                                                                                                          |
| X-ON/X-OFF flow control                         | ●                                                                                                                                                         | ●                                                                                                                                                         | ●                                                                                    | ●                                                                                                                                        | ●                                                                                                                          |
| <b>FILE TRANSFER</b>                            |                                                                                                                                                           |                                                                                                                                                           |                                                                                      |                                                                                                                                          |                                                                                                                            |
| <b>Options</b>                                  |                                                                                                                                                           |                                                                                                                                                           |                                                                                      |                                                                                                                                          |                                                                                                                            |
|                                                 | Send/capture,<br>Xmodem,<br>Xmodem-CRC<br>with failback,<br>Batch Xmodem,<br>Kermit,<br>Ymodem,<br>Batch Ymodem,<br>Telelink,<br>CompuServe<br>B, Wxmodem | Send/capture,<br>Xmodem,<br>Xmodem-CRC<br>with failback,<br>Batch Xmodem,<br>Kermit,<br>Ymodem,<br>Batch Ymodem,<br>Telelink,<br>CompuServe<br>B, Wxmodem | Send/capture,<br>Xmodem,<br>Xmodem-CRC<br>with failback,<br>Kermit,<br>HyperProtocol | Send/capture,<br>Xmodem,<br>Xmodem-CRC<br>with failback,<br>X PC, Kermit,<br>Ymodem,<br>Batch Ymodem,<br>Ymodem G,<br>Crosstalk,<br>DART | Send/capture,<br>Xmodem,<br>Xmodem-CRC<br>with 1K block,<br>Xmodem-CRC<br>with failback,<br>Kermit,<br>Ymodem,<br>Ymodem G |
| Time-out setting                                | ●                                                                                                                                                         | ○                                                                                                                                                         | ●                                                                                    | ●                                                                                                                                        | ●                                                                                                                          |
| Maximum number of retry<br>settings             | 15                                                                                                                                                        | Unlimited                                                                                                                                                 | Varies                                                                               | Varies                                                                                                                                   | 1,000                                                                                                                      |
| Translates outgoing data                        | ○                                                                                                                                                         | ○                                                                                                                                                         | ○                                                                                    | ●                                                                                                                                        | ○                                                                                                                          |
| Translates incoming data                        | ●                                                                                                                                                         | ●                                                                                                                                                         | ○                                                                                    | ●                                                                                                                                        | ○                                                                                                                          |
| Filters outgoing data                           | ○                                                                                                                                                         | ○                                                                                                                                                         | ●                                                                                    | ●                                                                                                                                        | ●                                                                                                                          |
| Filters incoming data                           | ●                                                                                                                                                         | ●                                                                                                                                                         | ●                                                                                    | ●                                                                                                                                        | ●                                                                                                                          |
| Background file transfer                        | ○                                                                                                                                                         | ○                                                                                                                                                         | ○                                                                                    | ○                                                                                                                                        | ●                                                                                                                          |
| Simultaneous two-way transfer                   | ○                                                                                                                                                         | ○                                                                                                                                                         | ○                                                                                    | ○                                                                                                                                        | ○                                                                                                                          |
| <b>MODEM COMMAND SETS</b>                       |                                                                                                                                                           |                                                                                                                                                           |                                                                                      |                                                                                                                                          |                                                                                                                            |
| Hayes original                                  | ●                                                                                                                                                         | ●                                                                                                                                                         | ●                                                                                    | ●                                                                                                                                        | ●                                                                                                                          |
| Hayes extended                                  | ●                                                                                                                                                         | ●                                                                                                                                                         | ●                                                                                    | ●                                                                                                                                        | ●                                                                                                                          |

●=Yes ○=No



|                                                 | ProComm<br>\$20                                    | PC-Talk4<br>\$99                      | HyperAccess<br>\$149                              | Crosstalk<br>ML4<br>\$245                          | Smartcom III<br>\$249          |
|-------------------------------------------------|----------------------------------------------------|---------------------------------------|---------------------------------------------------|----------------------------------------------------|--------------------------------|
| <b>ADVANCED FEATURES</b>                        |                                                    |                                       |                                                   |                                                    |                                |
| Unattended operation through:                   |                                                    |                                       |                                                   |                                                    |                                |
| Menus                                           | ○                                                  | ○                                     | ○                                                 | ○                                                  | ○                              |
| Batch files                                     | ●                                                  | ○                                     | ●                                                 | ●                                                  | ●                              |
| Macros                                          | ○                                                  | ○                                     | ○                                                 | ○                                                  | ○                              |
| Unattended remote transfer through:             |                                                    |                                       |                                                   |                                                    |                                |
| Menus                                           | ●                                                  | ○                                     | ●                                                 | ●                                                  | ○                              |
| Batch files                                     | ○                                                  | ○                                     | ●                                                 | ●                                                  | ●                              |
| Macros                                          | ○                                                  | ○                                     | ○                                                 | ○                                                  | ○                              |
| Multiple passwords                              | ○                                                  | ○                                     | ●                                                 | ○                                                  | ●                              |
| File transfers work with:                       |                                                    |                                       |                                                   |                                                    |                                |
| Any program for send/capture                    | ●                                                  | ○                                     | ●                                                 | ●                                                  | ●                              |
| Any program with Xmodem                         | ●                                                  | ○                                     | ●                                                 | ●                                                  | ●                              |
| Only another copy of the same program           | ○                                                  | ○                                     | ○                                                 | ○                                                  | ○                              |
| <b>UNATTENDED REMOTE OPERATIONS</b>             |                                                    |                                       |                                                   |                                                    |                                |
| Access to DOS level                             | ●                                                  | ○                                     | ●                                                 | Limited                                            | ●                              |
| Runs application programs remotely              | ●                                                  | ○                                     | ●                                                 | ○                                                  | ○                              |
| Works with any communications program           | ●                                                  | ○                                     | ●                                                 | ●                                                  | ●                              |
| Accepts different passwords for different users | ●                                                  | ○                                     | ●                                                 | ○                                                  | ●                              |
| <b>CUSTOMIZATION</b>                            |                                                    |                                       |                                                   |                                                    |                                |
| Script language                                 | Proprietary                                        | None                                  | HyperPlot                                         | CASL                                               | SCOPE                          |
| Learn mode                                      | ○                                                  | ○                                     | ○                                                 | ●                                                  | ●                              |
| User-defined menus                              | ○                                                  | ○                                     | ●                                                 | ●                                                  | ●                              |
| Creates macros                                  | ●                                                  | ●                                     | ●                                                 | ●                                                  | ●                              |
| <b>OTHER FEATURES</b>                           |                                                    |                                       |                                                   |                                                    |                                |
| Command strategy                                | Menus, function key commands, Alt-key combinations | Menus, Alt-key combinations           | Menus, function key commands                      | Menus, Alt-key combinations, command line          | Menus, function key commands   |
| Background memory-resident mode                 | ○                                                  | ○                                     | ○                                                 | ○                                                  | ○                              |
| Terminal emulation                              | DEC VT-52, VT-100, IBM 3101, and 8 others          | DEC VT-52, VT-100, TTY, and 35 others | DEC VT-52, VT-100, VT-220, IBM 3101, and 6 others | DEC VT-52, VT-100, VT-220, IBM 3101, and 12 others | DEC VT-52, VT-100, and 1 other |
| IBM PS/2 compatible                             | ●                                                  | ●                                     | ●                                                 | ●                                                  | ●                              |
| On-line help                                    | ●                                                  | ●                                     | ○                                                 | ●                                                  | ●                              |
| Copy protected                                  | ○                                                  | ○                                     | ○                                                 | ○                                                  | ○                              |

cations since its incorporation into *PC-Talk*. Kermit is a more recent option.

There are several variants of Xmodem, and purists will argue over the correct definition of each (see "Xmodem: The Case of the Changing Protocol," *PC Magazine*, October 28, 1986, page 129). For this article, we'll use the definitions most common in the MS-DOS world, plus a few others that have the advantage of being self-explanatory.

■ Error-checking protocols are essential. In a binary file, even a single error can be disastrous.

The standard version of Xmodem, as incorporated in *PC-Talk III*, *Crosstalk XVI*, *Smartcom II*, and most other communications programs for the PC, uses checksum error checking. Almost every MS-DOS communications program includes this as a choice, and some programs still offer nothing else. As a result, this standard Xmodem has been the most common file-transfer protocol for years.

Many programs offer Xmodem-CRC as a separate choice for file transfer. In theory, the CRC, or Cyclic Redundancy Check, error checking is less likely to let a mistake slip through than checksum error checking. In practice, however, I have yet to receive a file with the checksum version of Xmodem that turned out to be corrupted. Other programs offer a version of Xmodem that first tries CRC error checking, then falls back to checksum error checking if that fails. This Xmodem-CRC with fallback (the "real" Xmodem according to some) lets you initiate a transfer without worrying whether the other computer is using Xmodem with checksum or CRC.

Other variants of Xmodem make transferring files more convenient. For example, some permit batch commands and automatic naming of the file on the receiving side. With batch commands, you can use wildcards, as in SEND \*.DOC, to

## ■ COMMUNICATIONS PROGRAMS

send all the document files from a given directory. These variants are not yet as popular as standard Xmodem, but it's worth noting that every program reviewed here includes at least one of these variations in addition to the standard version.

Also gaining popularity is Kermit, a protocol that was developed at Columbia University and that has an important advantage over Xmodem: unlike Xmodem, it allows PCs to talk to minicomputers and mainframes. The front ends on some minis and mainframes can support only 7-bit data transfers and will choke and sputter on Xmodem's 8-bit data length. Kermit uses a 7-bit data length, even when the data requires 8 bits. When necessary, it uses a technique called 8th bit quoting to transfer 8-bit data. Essentially, this procedure lops off the 8th bit, sends it separately, and reassembles the 8 bits at the receiving side.

As with Xmodem, Kermit comes in variations. For example, not all programs that use Kermit include 8th-bit quoting. However, unlike Xmodem, all versions of Kermit can talk to one another. The Kermit protocol negotiates between the sending and receiving side to determine which features are supported by both. Even if you don't need Kermit now, it's potentially too important a protocol to ignore. Its presence in a program is very much worth your attention.

**HIGH-SPEED MODEMS** When PC-based communications were limited to 1,200 or 2,400 bits per second, you didn't have to worry about whether your favorite program could keep up with your modem. But with 9,600-bps modems, think again.

A key problem at 9,600 bps and higher is that the current crop of high-speed modems are all half-duplex: they can send information only in one direction at a time. This approach doesn't work well with most file transfer protocols.

In theory, error checking can apply to an entire file or to blocks of data within each file. In practice, it usually makes more sense to check blocks, since an error will then require the retransmission of only one block.

In Xmodem and most other protocols, the sending computer sends a block and waits for an acknowledgment before sending the next block. With a half-duplex mo-

dem, file transmission stops completely while the transmitting side waits for the modems to reverse the direction of communications. This delay can slow down file transfer significantly. (Other interactions between an error-correcting protocol and a high-speed modem also slow down file transfer. These vary from modem to modem, however, because each modem manufacturer uses its own proprietary

### ■ Kermit, a protocol developed at Columbia University, allows PCs to talk to minicomputers and mainframes.

scheme.) These delays are particularly bothersome when you consider that the high-speed modems already include their own error-checking protocols.

You can get around this problem by increasing the block size of your data so that the program will rarely stop and wait for acknowledgment. For example, the Crosstalk protocol in *Crosstalk XVI* and *Crosstalk Mk.4* will let you increase the block size from 256 bytes to 64K.

Even when half-duplex turnaround time is not an issue, the savings in overhead time can be significant. For example, using a 2,400-bps modem directly connected by a short modular phone cable and a 23K test file (not part of the PC Labs performance tests), increasing the block size in the Crosstalk protocol dropped file transfer time from 153 seconds to 118 seconds.

A second solution to the problem involves turning off the block acknowledgments—an approach taken by an Xmodem variant called Ymodem G. With *Smartcom III*, using a 23K test file and a 2,400-bps modem, standard Xmodem took 134 seconds for file transfer; Ymodem G took 101 seconds.

Still another solution is to let the transmitting computer get several blocks ahead of the acknowledgments before it stops

and waits. As with larger block sizes, this minimizes—and can even eliminate—the need to stop. This "sliding-windows" approach is incorporated in some versions of Kermit and in the DART protocol in *Crosstalk Mk.4*. (*HyperAccess* includes a protocol that is similar in concept but goes even further.)

The sliding-windows approach is valuable even if you don't use a high-speed modem. Long distance satellite phone connections also suffer from a significant turnaround time. A sliding-windows protocol can continue transmitting without having to wait for each packet, yet can still check each block for errors.

**A NEW CATEGORY OF PROGRAM** Even more important than new error-checking protocols or new high-speed modems is the introduction of a new category of communications program. Until recently, there were only two kinds of programs available—low-end programs like *PC-Talk III* and full-function programs like *Crosstalk XVI*.

Low-end programs offered all the features you'd ever need for real-time communications from the keyboard, typically including such features as automatic dialing, a reasonably large but limited phonebook, semiautomatic log-on to on-line systems, control over most communications parameters, the ability to send files as ASCII text or save incoming text to a file, and the ability to send and receive files with Xmodem.

Full-function programs improved on these basic features by offering unlimited storage of phone numbers, fully automated log-on, and additional file-transfer protocols to supplement Xmodem. These full-function programs also offered other features, such as unattended remote operation, and most included a limited script language to let you automate entire communications sessions.

Now several communications programs make the old "full-function" programs look unsophisticated by comparison. This new generation of software includes *Relay Gold*, *Crosstalk Mk.4*, and *Smartcom III* (see "Asynchronous Communications: Shopping for Software," *PC Magazine*, October 28, 1986). As a group, these programs redefine the high end of the

market. They are easier to use than most low-end programs, yet they can do more than programs like *Crosstalk XVI*, offering script languages that almost rival programming languages.

The new generation of communications programs are characterized in part by concurrent operations. *Relay Gold*, for example, can transfer files in both directions while you type messages at the keyboard or run another program in foreground. Both the *Crosstalk Mk.4* and *Smartcom III* programs can handle multiple communications sessions.

For newcomers to communications, these programs come with prewritten scripts for calling and logging on to most popular on-line systems. For intermediate users, they include a learn mode that will record a communications session and automatically create a script that you can use as is for simple tasks, or edit to add sophisticated branching and error-trapping capabilities. These programs also allow advanced users to change the way they interact with the program by writing or modifying scripts.

*PC Magazine* chose five new programs for testing in PC Labs because the programs and their predecessors represent some of the best and/or most popular programs from among the dozens available.

*HyperAccess*, along with *Relay Gold* and *Ascom IV*, was an Editor's Choice of a year ago. (So was *Microsoft Access*, a user-friendly but overly sluggish program that Microsoft stopped marketing.)

*Crosstalk XVI*, *PC-Talk III*, and *Smartcom* have been the most used communications programs on the PC for the past several years. *Crosstalk* was popular because it was good, and because a similar version was available on CP/M machines when talking between the two worlds was more important; *PC-Talk* because it was good as well as cheap; and *Smartcom* because, no matter what its flaws (and they were many), it was cheap: most anyone who bought a Hayes internal modem received *Smartcom II* in the deal.

Finally, *ProComm* has been perceived by many cost- and quality-conscious users as the heir apparent to *PC-Talk*.

The five are reviewed in alphabetical order by the program's name, from *Crosstalk Mk.4* to *Smartcom III*.

## Crosstalk Mk.4

The incredible reappearing program. *Crosstalk Mk.4*, was first announced in 1985 and then reannounced in mid-1987. The result was well worth the wait.

This new *Crosstalk* is big. It comes on two 360K disks and needs over 700K of disk space. A script file provided with the program guides you through its installation. For hard disk systems, you have only to put the program disk in drive A:, type INSTALL, and follow the directions on the screen. The script file will copy all files to the subdirectory of your choice, then will automatically call up a configuration script to help you set up the program for your system.

The configuration script asks about your modem, comm port, monitor type, and the like. It then hands control over to another script that shows you a list of the most common on-line services, including AT&T Mail, CompuServe, Delphi, Dow Jones News/Retrieval, Lexis/Nexis, MCI Mail, NewsNet, Official Airlines Guide, The Source, and Vu/Text. You select the services with which you have accounts,



## FACT FILE



**Crosstalk Mk.4,  
Version 1.01**  
DCA/Crosstalk  
Communications  
1000 Holcomb Woods  
Pkwy., #440  
Roswell, GA 30076  
(404) 998-3998

**List Price:** \$245

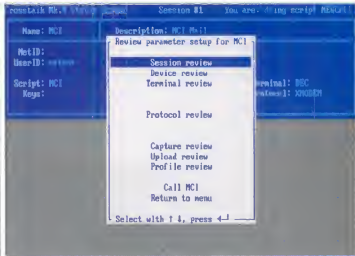
**Requires:** 384K RAM, two floppy disk drives (hard disk recommended), DOS 2.1 or later.

**In Short:** *Crosstalk Mk.4* is a new-generation program with such advanced features as multiple communications sessions and a learn mode that will create scripts for auto-log-on by recording your actions at the keyboard. No copy protected.

CIRCLE 640 ON READER SERVICE CARD

and the script walks you through entering your user names, passwords, and phone numbers for those services.

The installation script is reasonably complete. Choose MCI Mail, for example, and the script asks whether to call through MCI's own 800 number or the lo-



*Crosstalk Mk.4 shows status information in easily digestible chunks. Shown here are the menu choices for the seven different status screens. The pop-up menu is partially covering the phone book "card" for MCI Mail.*

# Zillions ready to zip to

- 3 1/2" format available from us. Specify when ordering.
- package includes both 5 1/4" and 3 1/2" disks.
- 3 1/2" format available from manufacturer by request. Call us for details.
- CP—copy protected, NCP—not copy protected

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We only carry the latest versions of products. Version numbers in our ads are current at press time.

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  - Design CAD 3.0 (NCP) ... 169.
- Application Techniques ... NCP**
  - Pizzazz 2.0 (see what your printer is missing) 45.
- Ashton-Tate ... NCP**
  - dBase III Plus 1.1 (the standard) ... call
  - Framework II 1.1 ... call
  - MultiMate Advantage II 1.0 ... 299.
- ATI ... NCP**
  - How to use DOS, BASIC ... each 33.
  - How to use Lotus, dBase III Plus ... each 43.
- Best Programs ... NCP**
  - BPC/TaxCut (for 1987 taxes) ... 45.
- Bible Research ... NCP**
  - THE WORD 4.0 (specify KJV or NIV) ... 159.
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  - Sidekick 1.5 ... 57.
  - Turbo BASIC 1.0 ... 67.
  - Turbo C 1.0 ... 67.
  - Turbo Pascal 4.0 ... 67.
  - Superkey 1.1 ... 67.
  - Turbo Lightning 1.0 (speller, thesaurus) ... 67.
  - Reflex Workshop ... 67.
  - Reflex 1.1 ... 99.
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  - Quattro 1.0 ... 129.
  - Paradox 2.0 (easy-to-use database) ... 419.
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  - Crosstalk XVI 3.61 ... 95.
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## PC Connection Software Special

through January 31, 1988

### North Edge Software ... NCP

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Are you tired of using little slips of paper to keep track of time spent on client's projects? Timeslips will relieve you of that drudgery by letting your computer do the work.

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- Allows you to customize bills and reports, will also graph results with or without a graphics monitor
- Can manage up to 3,400 clients
- Comes with a thirty-day money-back guarantee

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## ■ COMMUNICATIONS PROGRAMS

cal Tymnet number. For novices, the script also explains the meanings of terms such as network IDs, user IDs, and passwords.

If you've used *Crosstalk XVI*, you'll notice that it has almost nothing in common with *Crosstalk Mk.4*. The opening screen of the new package offers a short list of menu choices rather than an overwhelming status screen. Program settings are selected through setup boxes. These present status information in small, easily digestible chunks and only show you the information when you ask to see it.

*Crosstalk Mk.4* will let you give commands through menus, through Alt-key combinations, or through typed commands at the command line. The menus are the obvious choice for beginners. However, once you know your way around the program, the easiest way to use it is through typed commands and Alt-key combinations.

Most of *Crosstalk Mk.4*'s commands are different from their equivalents in *Crosstalk XVI*. If you've used any communications program, you'll be able to quickly progress from the menus to the Alt-key commands and then to the command line. But *Crosstalk XVI* users will go no faster than anyone else.

The manual for *Crosstalk Mk.4* is designed for those who would rather learn by doing. Each subject in the manual gets its own chapter, even if it's only two pages long. The chapter headings themselves provide a quick overview of the package's features. They include Terminal Emulation (the program can emulate more than a dozen common terminals) Text Editor (*Crosstalk Mk.4* has a built-in text editor or will let you use your own), and Multiple Communications Settings (the program can manage multiple on-line sessions either through multiple devices connected to your computer or through Tymnet, using the X-PC protocol). The first four chapters include a quick tutorial that serves as an introduction to the program.

**CASL** Of course, the centerpiece of *Crosstalk Mk.4* is the Crosstalk Application Script Language, CASL, and the longest section of the manual is the 250-page chapter devoted to CASL. With all the features of a general-purpose program-

ming language, CASL even compiles scripts before it runs them to increase speed of execution.

If you merely want to create a script for automatic dialing and log-on, *Crosstalk Mk.4* has a learn mode that can watch you log on to a system and create a script for you. Also, the scripts that come with the program are a good starting point for creating new log-on scripts.

Error-checking file-transfer options in *Crosstalk Mk.4* include the Crosstalk protocol found in *Crosstalk XVI*, Kermit, and several variations on Xmodem, (standard Xmodem, Xmodem-CRC, Ymodem, Batch Ymodem, and Ymodem G). Most interesting is DART, a new proprietary sliding-windows protocol that includes data compression to speed file transfers, as well as another feature that lets you adjust the block size of your data.

Although there is no one best block size for file transfer, in general, on a noise-free line, a large block size will yield faster transfer since there will be fewer blocks and less error-checking overhead. On a noisy line, a small block size has an advantage because less data will have to be retransmitted with each error.

DART will adjust the block size up or down based on how many errors it is picking up. This automatically results in larger blocks on a noise-free line and smaller blocks on a noisy line. DART can also recover from an interrupted file transfer, letting you reestablish communications and pick up the transfer in mid-file.

On the PC Labs performance tests at 2,400 bits per second, DART tied *HyperAccess* for file transfer of a 100K ASCII file consisting of the letter "a," but it failed to show any significant compression of the 100K ASCII text file. File transfer times for the noncompressible binary files, the 100K text file, and the batch transfer of 100 1K files fell comfortably in the second tier of programs. This is a respectable speed and good enough to keep *Crosstalk Mk.4* in the running—unless speed of file transfer is the only issue that matters.

*Crosstalk Mk.4* is not the answer for everyone. At \$245, it is among the most expensive communications programs. What's more, although its 700K of files will fit on a 1.2MB 5¼-inch disk or a 720K 3½-inch disk, it's hard to recom-

mend it for a floppy-disk-based system. If you're on a budget or need something leaner, look elsewhere.

But if you have the money and the disk space to spare, *Crosstalk Mk.4* offers more features than you may ever need. The program's natural home is on a hard disk that belongs to someone who can make full use of the CASL language. Yet the prewritten scripts make it appropriate for beginners, and the learn mode makes it easy for anyone to write simple scripts. If the idea of the CASL language makes your mouth water or if you want a program that gives you room to learn and grow, *Crosstalk Mk.4* is your kind of program.

## HyperAccess

*HyperAccess* makes no claim to be a new-generation communications program, but it comes close anyway. It's easier to use than some low-end programs, it has all the features you would expect in a full-function program, it offers fast file-transfer times, and it has a script language that can hold its own against the new-generation languages. All that's missing is a concurrent operations feature.

Hilgraeve's *HyperAccess* is filled with pleasant surprises, starting with an instal-



## FACT FILE

**HyperACCESS**

*HyperAccess*,  
Version 3.23  
Hilgraeve Inc.  
P.O. Box 941  
Monroe, MI 48161  
(800) 826-2760  
(313) 243-0576 (in  
Mich.)

List Price: \$149

Requires: 192K RAM, one floppy disk drive (two recommended), DOS 2.0 or later.

In Short: A good program by any measure, *HyperAccess* offers fully menu-driven remote operation, a high-powered script language, an unusually fast and easy-to-use menu structure, and fast file transfer between two copies of *HyperAccess*. Not copy protected, but will not talk to another copy with the same serial number.

CIRCLE 84 ON READER SERVICE CARD



lation procedure that is as painless as it could be. To install the program on a hard disk system, you copy it to your hard disk and type HA. The first time the program comes up, it runs a start-up script that asks what modem you have, what com port it uses, whether you have a color monitor, and other simple questions. The script then makes the appropriate adjustments to the program, adds a line to your CONFIG.SYS, and warns you to reboot your system before using HyperAccess.

Once installed, the program comes up with a straightforward main menu. There is nothing snazzy here—no pull-down or pop-up menus, no innovative use of color to draw your attention to different parts of the screen—just meat and potatoes. Still, the design of the screens is suitable for both beginners and advanced users.

Each menu offers a list of options available through function key commands. In most of the HyperAccess's menus, the left side of the screen shows the function keys and a one- or two-word description of the option, such as "F1 Call." To the right is a fuller explanation of each command, such as "Place calls or be a direct-cabled terminal" for F1. Advanced users can simply glance down the left side of the screen to see their options. Beginners can read the explanations.

The program design is straightforward enough so that even beginners may not need the clearly written and well-illustrated manual, except for using the script language. Designed to function both as a guide and a reference, the manual includes 15 short, easily digestible chapters, each one covering a single topic such as placing calls, sending text files, or error-checking protocols.

Automatic log-on in HyperAccess is handled through scripts that you "attach" to individual phone numbers, along with setup files and bit-per-second rate. If you wish, you can limit the scripts attached to phone numbers to sign-on functions. For example, as shipped, the program comes with two scripts for MCI Mail: one simply signs on to the system; the other retrieves incoming messages as well. One shortcoming is that there is no security for your passwords. These are stored in separate ASCII files that are readable by anyone who knows the DOS TYPE command.

```

HyperACCESS
Call
Modem port = 1
Hayes Smartmodem 2400

Press F1-F5 for option, F9 for previous menu, or F10 for conn screen
Use PgDn and PgUp keys to scroll

F1 Place a data call
F2 Place a voice or voice/data call
F3 Edit the list (Add, Change, or Delete)
F4 Redefine the modem and modem port
F5 Log calls in CALL.LOG                               : Yes

0 Remote System      Telephone Number      Setup      Faxd      Sign-on
1 A Simulated Remote System... 1-800-555-1212 CALL      1200
2 A HyperACCESS computer... .. N/A CALL      1200 HASIGNON
3 CompuServe (CS network)... .. N/A COMPSERVE 1200 CISNET
4 Bow Jones... .. N/A BOWJONES 1200 BOWTH
5 EasyLink... .. 1-800-325-4112 EASYLINK 1200 EASYLINK
6 MCI Mail... .. 1-800-323-6905 MCI MAIL 1200 MCI
7 NewsNet (direct 1200 baud)... 1-215-660-2645 NEWSNET 1200 NEWSNET
8 THE SOURCE (300 baud WATS)... 1-800-360-3343 SOURCE 300 SOURCECT

```

8:00

HyperAccess uses a function-key-driven menu structure. Shown here is the dialing directory as shipped. Note that the list includes phone numbers for many on-line e-mail systems. Sign-on scripts are attached to most of the entries.

Of special note is an on-disk tutorial covering communications in general and HyperAccess in particular, including such basics as how to use a modem and how to transfer files, how to set communications parameters for specific systems, and even such advanced topics as using the unattended host feature and writing a simple script for automatic sign-on.

**SCRIPT LANGUAGE** The HyperAccess script language, HyperPilot, is well suited to building complex communications scripts. In fact, many of the HyperAccess menu functions for placing and answering calls are themselves HyperAccess scripts. In addition, the program comes with a "script disk" containing about 35 script files. These range from a simple two-line script that clears the terminal screen to the 943-line script that the program uses for its answer functions. Between these extremes are scripts like those for retrieving e-mail messages from CompuServe and MCI Mail. You can even build a script that will hide the HyperAccess menus and let you create your own (though you can't modify the built-in menu structure as you can in

Crosstalk Mk.4). Like Crosstalk Mk.4's CASL, HyperPilot even compiles its scripts for faster execution.

The unattended host feature in HyperAccess is also noteworthy. Fully menu driven, its security features include password protection with up to 100 individually assigned passwords and three levels of access. You can also keep track of who is using your system as an unattended host. HyperAccess uses the individually assigned passwords to generate a log of incoming calls.

Users of multitasking environments such as DESQview, TopView, Double-DOS, or Microsoft Windows, may also be interested in knowing that Hilgraeve claims complete compatibility with all of these environments, and that HyperAccess will run in the background under any of them. Since HyperAccess needs only 110K to 92K, you can also run multiple communications sessions using any of these alternate operating environments.

Although HyperAccess fares well by any measure, file transfer is the area where it really shines. File transfer protocols include Xmodem (standard Xmodem, Xmo-

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## ■ COMMUNICATIONS PROGRAMS

dem-CRC, and Xmodem-CRC with fallback), Kermit (with 8th-bit quoting and data compression), and the proprietary HyperProtocol.

HyperProtocol is single-mindedly designed for speed. It eliminates the overhead of stopping to wait for acknowledgments by the simple strategy of never stopping. The receiving end acknowledges reception on completion of the transfer, but it also sends one "deadman acknowl-

minutes 15 seconds was less than half the time of the next fastest program.

If you're looking for an easy-to-use, general-purpose communications program, *HyperAccess* is certainly a good choice. If your primary concern is fast file transfer and you can control the program to be used on both sides of the link, *HyperAccess* may well be your best choice.



## ■ Although *HyperAccess* fares well by any measure, file transfer is where it really shines.

edgment" per minute on long transfers to assure the sending side that it is still there. If a block turns out to have an error, the receiving side requests retransmission, and the sending side backs up to that block. This scheme works particularly well with high-speed modems.

*HyperAccess* also speeds transfer by compressing files. The program first checks to see if it is talking to another copy of *HyperAccess*. If so, it compresses the data as it sends it no matter what protocol is being used. Hilgraeve boasts that the combination of data compression and uncumbered transmission lets *HyperAccess* transfer files faster than any other communications program at any given connect speed. The results of the PC Labs performance tests in general bear out the truth of this assertion.

Although *HyperAccess*, *ProComm*, *Smartcom III*, and *Crosstalk Mk.4* all took between 7 minutes and 7 minutes 30 seconds to transfer noncompressible 100K files, *HyperAccess* pulled ahead on compressible files. On the file transfer test using a 100K ASCII file consisting of the letter "a," *HyperAccess* tied *Crosstalk Mk.4* for first place, with a time of just 8 seconds. More important, on the more representative 100K text file, *HyperAccess* was the only program that showed significant compression. Its file transfer time of 3

## PC-Talk4

*PC-Talk4* will be immediately recognizable to anyone who is familiar with *PC-Talk III*. In fact, the biggest surprise in this program is how little it has changed in its first upgrade in years. This is doubly curious, considering that the new version is sold as standard commercial software rather than freeware and that the price has nearly tripled, going from \$35 to \$99.

Installing *PC-Talk4* is trivial. Simply copy the program to your working disk and load it. The dialing directory already includes the proper dialing command for Hayes-compatible modems. The default settings for logged drive (B:), printer port (LPT1:), and comm port (COM1:) will be appropriate in most cases. Should you need to change them, the settings screen is available through an Alt-key combination.

Ease of learning and ease of use have always been strong points for *PC-Talk*, largely because the program has relatively



## FACT FILE



**PC-Talk4,  
Version 1.39F**  
Headlines Corp.  
P.O. Box 8  
Tiburon, CA 94920  
(415) 435-0770  
List Price: \$99

Requires: 256K RAM,  
one floppy disk drive, DOS 2.0 or later.

**In Short:** The program that established a standard in MS-DOS communications is little changed from its previous incarnation. One noteworthy new program feature is a long list of optional terminal emulations. Not copy protected.

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## ■ COMMUNICATIONS PROGRAMS

few features. *PC-Talk4* has no script language and no ability to automate communications sessions, except for automatic dialing and log-on in response to a keyboard command.

The program gets its marching orders through Alt-key combinations. The most common commands are shown at the bottom of the screen whenever you are in terminal mode.

*PC-Talk4* wakes up in terminal mode, so that anything you type will go to the comm port. If you like, you can dial all your calls this way, giving commands and phone numbers to the modem by typing them directly. Or, you can go to the dialing directory and let the program dial them for you. The dialing directory stores the basic communications settings to go with each phone number. It also lets you redial continuously to get through to a busy number.

Headlands Corp., which now distributes *PC-Talk*, provided a list of differences between *PC-Talk III* and *PC-Talk4*. This was convenient, because most of the 14 changes are relatively subtle.

**IMPROVED MANUAL** Probably the most obvious difference is *PC-Talk4*'s printed manual—a big improvement over the do-it-yourself manual in *PC-Talk III*. Newcomers to communications will appreciate the troubleshooting chapter entitled "Seven Mysteries of Data Communications." The introductory chapters may also be helpful to beginners.

If the printed manual is the most obvious difference, the most important new addition to *PC-Talk* is terminal emulation. As shipped, *PC-Talk4* includes VT-100 and VT-52 emulation. You can toggle between these and standard TTY emulations with an Alt-key combination while you're on-line. Headlands Corp. offers additional emulation packages for 35 other terminals at \$49 each.

The list of terminal emulation packages includes the AT&T 610, several ADDS Regent and ADDS Viewpoint models, DEC VT-220, IBM 3101-10 and 3101-20, and various terminals from Hazeltine, Hewlett-Packard, Honeywell, Lear Siegler, Perkin-Elmer, TeleVideo, and Wyse. Headlands claims that each of these packages provides an "exact emulation" with full keyboard and screen support.

| — PC-TALK4 COMMAND SUMMARY —  |                        |              |
|-------------------------------|------------------------|--------------|
| Alt-A show Alt (1-8)          | Alt-M do DOS command   |              |
| Alt-B Bell toggle             | Alt-O change emulation |              |
| Alt-C Clear screen            | Alt-P comm Parameters  |              |
| Alt-D Dialing dir             | Alt-Q Quick redial     |              |
| Alt-E Echo toggle             | Alt-R Recv file (PgDn) |              |
| Alt-F prog defaults           | Alt-S Screenshot       |              |
| Alt-G Get new subdir          | Alt-T Tran file (PgUp) |              |
| Alt-H Hang up                 | Alt-U Unload alt (1-8) |              |
| Alt-I retrieve alt            | Alt-V View files/space |              |
| Alt-J macro keys              | Alt-W wrgn Width alarm |              |
| Alt-K macro Keys              | Alt-X eXit PC-TALK4    |              |
| Alt-L Logged drive            | Alt-Y delete a file    |              |
| Alt-M Msg toggle              | Alt-Z elapsed time     |              |
| — VT100 SCREEN EMULATION ON — |                        |              |
| — VT52 SCREEN EMULATION ON —  |                        |              |
| — TTY —                       |                        |              |
| — DOS ACCESS —                |                        |              |
| Enter program name or DOS co  |                        |              |
| — CANCELLED —                 |                        |              |
| Ctrl-End                      | Send Sust Break        | =FILE XFERN= |
| Ctrl-PrtSc                    | Simult Print           | XMODEM =x    |
| Shift-TAB                     | Chg Temp Alt (1-8)     | +CRC =c      |
| Shift-PrtSc                   | Print Screen           | Binary =b    |
| Ctrl-Home                     | Split Scrn Toggle      | Pacing =p    |

The *PC-Talk4* command summary can be evoked at any time during a communications session from the terminal screen. The status messages on the terminal screen (left side) show the toggling of terminal emulations and the DOS access command.

Other new features in *PC-Talk4* let you use DOS commands without leaving the program, hang up with an Alt-key combination, and change speed settings on the fly without breaking the communications link. Still others are merely enhancements of old features, like the expansion of the

communications software to beat. Unfortunately, *PC-Talk4* does not carry on that tradition. Priced at \$99, it costs twice as much as *ProComm*, a program that does more. If you need one of the *PC-Talk4* terminal emulations and can't find it elsewhere, the program may well be worth the price. But as a general-purpose communications program, *PC-Talk4* is, sadly, not in the running.

■ As a general-purpose communications program, *PC-Talk4* is, sadly, not in the running.

### ProComm

*ProComm* is the program that *PC-Talk4* should have been. Similar to *PC-Talk* in its command logic and program structure, *ProComm* adds such features as a script language, unattended remote operations, and a long list of choices for file transfer. Even with these powerful capabilities, it remains remarkably easy to learn and use.

The most difficult part of using *ProComm* is installing it. In their normal state, the files for *ProComm* need about 560K of disk space—too much to fit on a single 360K disk. Datastorm Technologies fits them on a single disk anyway, by compressing them first, in a format known as ARC, for ARChive.



*These unretouched print samples show the superior print quality of QMS-PS 810 over printers using first-generation print engines.*



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## ■ COMMUNICATIONS PROGRAMS

Installation consists of extracting the files and putting them on a working disk.

The procedure isn't difficult, but it's an extra step that could be confusing if you've never done it before.

This extra step is also noteworthy because the program otherwise goes out of its way to work hard so that you don't have to. For example, the command for uploading (sending) a file in *ProComm* is *PgUp*, the same as it is in *PC-Talk4*. However, when you choose the upload command in *PC-Talk*, you then have to be sure to specify the file transfer method by typing *FILENAME=X* for standard Xmodem, *FILENAME=C* for Xmodem-CRC, or simply *FILENAME* for sending the file as ASCII text.

Even if you know the proper command in *PC-Talk*, it's likely that you'll occasionally forget to use it. Leaving off the *=X* on a binary file transfer does no harm, but you have to go back and set up the transfer again. *ProComm* won't let you forget. Choose the upload command in *ProComm*, and you get a list of file transfer options. Only after you specify a file transfer option do you get to name the file.

**EASY TO USE** Design touches like this not only make *ProComm* easy to use, but also ensure that if you're at all familiar with communications, you won't have to



The *ProComm* help screen shows all the Alt-key commands. Commands are divided into types of functions.

look at the manual except to learn the script language. If you're not familiar with communications, the combination of the *READ.ME* file on disk plus the manual will quickly tell you what you need to know. You can order *ProComm* from Datastorm Technologies for \$50 for the disk and the printed manual, or for \$35 for the disk only. You can also receive the disk or download the program from a BBS and become a registered user for just \$25. If you have the disk, you can print the manual yourself.

*ProComm*'s overall design is very much like that of *PC-Talk4*. Like *PC-Talk4*, *ProComm* handles most commands through Alt-key combinations, and a single key brings up the program's help screen, which lists all commands.

Like *PC-Talk* also, *ProComm* wakes up in terminal mode, so that anything you type will go to the comm port; hence you can give commands and phone numbers to the modem by typing them. Or, you can go to the dialing directory and let *ProComm* dial for you. Like *PC-Talk*, the dialing directory stores the basic communications settings. It also lets you link a script file to a phone number for automatic log-on.

The *ProComm* script language is roughly equivalent to the *Crosstalk XVI* script language. The inclusion of several auto-log-on scripts on the disk make it easy to create your own scripts through modifying what's already there. It took me only a few minutes to convert the auto-log-on script for The Source into a script for MCI Mail.

*ProComm*'s range of file transfer protocols is another strong point. The choices include six variations of Xmodem, Kermit (complete with data compression, sliding windows, and 8th-bit quoting), and CompuServe B (for use with CompuServe Information Service). The Xmodem variations include Xmodem-CRC with fallback, Batch Xmodem, Ymodem and Batch Ymodem (Ymodem uses 1K blocks), and two less common variants found on specific on-line systems.

Alas, *ProComm*'s file transfer speeds were not as impressive as its list of protocols. On the PC Labs performance tests at 2,400 bits per second, *ProComm* fared well enough. The transfer times for the noncompressible files put *ProComm* comfortably in the mid-range of programs, along with *Crosstalk Mk.4* and *Smartcom*

**FACT FILE**

**ProComm, Version 2.4.2**  
Datastorm Technologies Inc.  
P.O. Box 1471  
Columbia, MO 65205  
(314) 474-8461

**List Price:** Complete package with manual, \$50; disk only, \$35.  
**Requires:** 130K RAM, one floppy disk drive, DOS 2.0 or later.

**In Short:** A full-function communications program at a low-end price, *ProComm* includes a wide range of error-checking protocols, a remote-operation feature with two levels of password, and a script language for fully automating communications sessions—all in a package that is easy to learn and use. Not copy protected.

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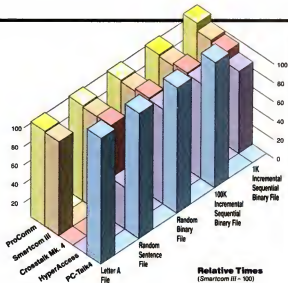




## Performance Tests: Communications Programs

In all tests at 2,400 bits per second, **HyperAccess** was the front-runner. Even though it came in first in the multiple-file transfer test at 2,400 bps, it was slowed considerably by its auto-logging activity.

On the whole, **Crosstalk Mk. 4**, **Smartcom III**, and **ProComm** performed equally well, with little variation in results across the board. However, when data compression was used, **Crosstalk Mk. 4** raced ahead of **Smartcom III** and **ProComm**. The most striking results were the significantly slower file transfer speeds of **PC-Talk4**, which came in a decided last in all tests.



### IBM PS/2 Model 80 at 2,400 bps

#### Performance Times

(Times given in seconds)

|                 | Letter A File | Random Sentence File | Random Binary File | 100K Incremental Sequential Binary File | 1K Incremental Sequential Binary File |
|-----------------|---------------|----------------------|--------------------|-----------------------------------------|---------------------------------------|
| ProComm         | 7.22          | 7.23                 | 7.23               | 7.24                                    | 9.14                                  |
| Smartcom III    | 7.12          | 7.12                 | 7.12               | 7.12                                    | 8.45                                  |
| Crosstalk Mk. 4 | N/A*          | 7.17                 | 7.31               | 7.30                                    | 8.18                                  |
| HyperAccess     | N/A*          | 3.15                 | 7.20               | 7.20                                    | 7.37                                  |
| PC-Talk4        | 9.53          | 9.51                 | 9.51               | 9.50                                    | NA†                                   |

N/A\*—Not applicable: results too small to be measured

NA†—Not applicable: program doesn't support batch transfer.

PC Magazine's data transfer performance tests measure the data transfer rates of packages capable of moving files between two PCs at speeds of up to 115,200 bits per second, roughly the speed of a floppy disk. The tests also factor in the programs' reliability and file compression capabilities. Without file compression, most PC-to-PC transfers are limited to 9,600 or 19,200 bps.

The tests transfer five data and program files from an 8-MHz IBM PC AT with a 512K RAMdisk to the 512K RAMdisk of a 16-MHz IBM PS/2 Model 80. RAMdisks were used instead of hard or floppy disks in order to minimize the overhead of physical disk reads and writes.

PC Labs ran two series of tests on each program. In the first series, data was transferred at a rate of 2,400 bps. In the second series, data was transferred at each program's maximum reliable speed, ranging from 9,600 bps to 57,600 bps. For most of the packages tested, results for file transfer at maximum reliable speed fell below 1 second and are therefore not shown.

The five tests cover a range of binary and data files that vary widely in their compressibility, including two that are almost completely compressible and uncompressible. The transfer times of the first four tests will be approximately the same if data compression techniques are not used.

The **Letter A File** performance test measures the time it takes to transfer a 100K pure-ASCII file that consists of the letter A repeated 100,000 times. The file format was selected to optimize data compression; it should be transferred the fastest if data compression techniques are used.

The **Random Sentence File** performance test measures the time it takes to transfer a 100K text file consisting of randomly generated sentences. Data compression techniques will reduce the transfer time of this type of file to less than that of the random binary file, but it will still be slower than the ASCII file containing all e's.

The **Random Binary File** performance test measures the time it takes to transfer a 100K random binary file that emulates DOS program and binary data files. This file should be transferred faster than the incremental sequential binary file but slower than the randomly generated sentence file with data compression. There should be little difference with no data compression.

The **100K Incremental Sequential Binary File** performance test measures the time it takes to transfer a 100K incremental sequential binary file. The file was created in this format to minimize data compression and the speed advantage obtained when file compression is in effect.

The **1K Incremental Sequential Binary File** performance test measures the time it takes to transfer 100 incremental sequential binary files of 1K each. This test determines the programs' speed and ability to tag and transfer multiple files.

If a program transfers files at similar speeds for the first four data tests, it has no data compression capabilities.



■ **ProComm** is a respectable, full-function, general-purpose communications program, made all the more impressive by its price of \$25 to \$50.

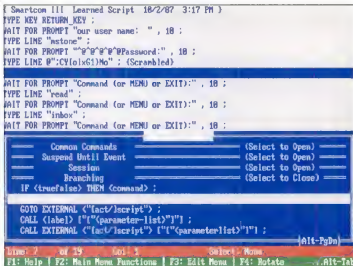
**III.** On the test of batch transfer of 100 1K files, *ProComm* came in about 1 minute slower than *Crosstalk Mk.4* and one-half minute slower than *Smartcom III*.

*ProComm's* shortcomings showed on a second set of tests. On the PC Labs performance tests with each 100K file, *ProComm* is about 12 seconds slower than *Smartcom III*. This is not a large difference for file transfers that take more than 7 minutes. However, I also compared the transfer times for two 23K files: one .COM file and one text file. These tests showed the same 12-second difference (or more) between *ProComm* and *Smartcom III*, resulting in a significant difference in throughput with smaller files.

*ProComm* has other features worth mentioning, including terminal emulation for ten terminals and an unattended remote-operations feature with two levels of password protection. *ProComm* is a respectable, full-function, general-purpose communications program, made all the more impressive by its price of \$25 to \$50. Unless you're anxious to use one of the new-generation programs or need a particular capability that *ProComm* lacks, there's no point in looking any further.

## Smartcom III

*Smartcom III* shares the first half of its name with *Smartcom II*, but that association may be misleading. It suggests that *Smartcom III* is merely an upgrade of its older sibling. In reality, the two programs have almost nothing in common.



*Smartcom III* can create log-on scripts through a learn mode that records the activity in an on-line session. Shown here is a script for MCI Mail that is being edited with *Smartcom's* built-in *SCOPE* script editor. The help window labeled "*SCOPE Commands*" appears in the bottom half of the screen. The password in the script has been automatically encrypted.

Whether you like *Smartcom II* or not, that's very good news. By starting from scratch, Hayes was able to design a program that is packed with features, yet easy to learn and use. Where *Smartcom II* had

nothing but its parentage to make it stand out from the crowd, *Smartcom III* demands your attention on its own merits.

*Smartcom III* is even bigger than *Crosstalk Mk.4*; it needs about 1.4MB of disk space (or a minimum of 800 to 900K if you leave out the help file and other nonessential files) and is meant to be run from a hard disk. The program comes with a READ.ME file that explains how to make it work on 720K disks or 360K disks, but that was not how it was designed to be used. It will also work only with Hayes-compatible modems.

Installation on a hard disk is simple. You only have to put the disk labeled "disk 1" in your A: drive, type INSTALL, and follow the directions on the screen. The install program will add the line FILES=20 to your CONFIG.SYS file, but it will ask you for permission first. If you prefer to install the program manually, or if you just want to know what the installation will do to your hard disk, the manual explains the procedure in an appendix.

Easy to learn and use, *Smartcom III*

### FACT FILE

**Smartcom III,**  
Version 1.0b  
Hayes Microcomputer  
Products Inc.  
705 Westech Dr.  
Norcross, GA 30092  
(404) 441-1617  
List Price: \$249

**Requires:** 512K RAM, two floppy disk  
drives (hard disk strongly recommended),  
DOS 2.0 or later.

**In Short:** This new-generation program has  
a learn mode for creating scripts by mimick-  
ing your actions at the keyboard and a sophis-  
ticated help feature for writing scripts from  
scratch. It can also handle multiple commu-  
nications sessions. Not copy protected.

CIRCLE 636 ON READER SERVICE CARD

## ■ COMMUNICATIONS PROGRAMS

takes most of its directions from short, self-explanatory pop-up menus. Choices on the main menu, for example, include Initiate a Session, Terminate a Session, Editor, Disk Operations, Program Settings, and Quit Smartcom III. A beginner can choose options from the menus in any

■ **As with Crosstalk Mk.4, Smartcom III's script language is the main attraction. It can handle tasks ranging from automatic log-on to creating terminal emulation.**

of three ways: by "point and shoot," by using cursor keys and the return key, or by typing the first letter of each command. More experienced users can type in commands without having to wait for each menu to appear.

A few commands are given through function keys. The F1 key, for example, always calls up a context-sensitive help screen. F2 always takes you back to the main menu, no matter where you are in the program. The pop-up menus, plus on-line, context-sensitive help may save you from ever having to open the manual.

**SCOPE** As with *Crosstalk Mk.4*, *Smartcom III's* script language is the main attraction of the program. SCOPE (an acronym for Simple Communication Programming Environment) can handle tasks ranging from automatic log-on, to building your own bulletin board, to creating terminal emulations. (The VT-102 and VT-52 terminal emulations in *Smartcom III* are built into the program. If you need others, you can write your own.)

As a demonstration of what SCOPE can do, the *Smartcom III* unattended remote-access feature is a script file. The first time you use the remote-access script, it asks you to enter a welcome message to

display, a list of the disk drives the caller can use, the password for signing on to your system, and the name of the communications parameter setting file to use.

The script records all your answers for future use. Each time you call it up, the script asks if you want to change any settings. A caller signing on to the remote-access script will see something like a limited bulletin board.

SCOPE is also noteworthy for the help it provides in building scripts. To create a script for automatic log-on, you can simply turn on the learn feature, log on manually, and let *Smartcom III* generate the script for you. If you need something more complex, you'll have to write the script without *Smartcom III's* powers of automation. You can use any text editor for this, but *Smartcom III's* built-in script editor can give you help.

The help screen in the SCOPE editor takes up the bottom half of the screen. At first glance, it looks like no more than a list of commands and their proper syntax. However, because you can instantly change the order of the list from purely alphabetical to sorted by category, finding the proper command on-screen is far easier than looking through a printed list.

When sorted by category, the help screen behaves like an outline program. You can browse through the category names, then expand any one category to see the command list.

The help feature also does more than help you find the right command. You can jump to the help window with a function key, point to the command you want, and the SCOPE editor will insert the command in your script along with reminders for the arguments you have to add. In some cases, it will prompt you for more information and insert that as well.

*Smartcom III* comes with a series of scripts that help automate the use of six on-line systems: CompuServe, Dow Jones News/Retrieval, Easylink, GENie, Telemail, and The Source. These scripts were written and supplied to Hayes by each on-line service vendor. The functions in the scripts vary from one to the next, but in general they supply menus for using the particular system. Rather than having to remember the full menu path for navigating through CompuServe, for example,

## PC EDITOR'S CHOICE

### ● The choices are many

*If you're on a tight budget, ProComm offers the most bang for the buck. Not only does it have the same features as programs that cost two and three times as much, but it redefines the low end of the market. At \$50 for disk plus manual or \$35 for disk only, ProComm is worth looking at—if only to see what other programs are up against.*

*If you regularly transfer a lot of files between the same locations—and particularly if you transfer them at long-distance phone rates—HyperAccess is the program you want. As the PC Labs benchmarks show, the savings in time can be significant when transferring compressible files. Keep in mind, however, that the HyperAccess proprietary protocol and data compression capabilities come into play only if HyperAccess is used on both sides of the link.*

*For those with fast hard disks and disk space to spare, head-to-head competitors Crosstalk Mk.4 and Smartcom III offer a learn mode, multiple communications sessions, and other advanced features. Both programs offer new features that deserve to become industry standards, and both succeed admirably in what they set out to do. You won't be disappointed with either one.*

you can pick an option from the menu provided by the *Smartcom III* script, and the script will automatically send the proper commands to the system. According to Hayes, the vendors will supply updated scripts as needed, should they change their on-line structure.

For file transfer, *Smartcom III* offers Kermit and five Xmodem variants—standard Xmodem, Xmodem-CRC, Xmodem-CRC with 1K block size (standard Xmodem uses 128 byte blocks), Ymo-

dem, and Ymodem G. Notable for its absence is the Hayes protocol found in *Smartcom II*. You can speed up file transfers and minimize the cost of on-line time by using *Smartcom III*'s data compression feature, but doing so requires extra time and extra steps to compress the file before you send it and decompress it afterwards.

On the PC Labs file transfer tests at 2,400 bps, *Smartcom III* did well. It was marginally the fastest program tested with

■ The program may be big, but it's not sluggish—at least in file transfer time. If speed of file transfer is an important issue, *Smartcom III* is worth consideration.

the 100K noncompressible files. For the 100K text file, it was bested only by *HyperAccess*, which has the advantage of data compression. Overall, *Smartcom III* scored solidly in the mid-range of programs, along with *Crosstalk Mk.4*. The program may be big, but it's not sluggish—at least not in file transfer time. If speed of file transfer is an important issue, *Smartcom III* is worth consideration.

As with *Crosstalk Mk.4*, *Smartcom III* is not for everyone. It is certainly not meant for those with floppy-disk-based computers, non-Hayes-compatible modems, or slow hard disks. Priced at \$249, it is also not meant for those on a tight budget. But if you have the money and the disk space to spare, and if you're more than a casual communicator, you'll find *Smartcom III*'s learn mode and help in writing scripts highly welcome. If you want a program that makes communications easy but also gives you room to grow, *Smartcom III* is a strong contender.

M. David Stone is a contributing editor of PC Magazine.

# TurboTax

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 "TurboTax is still the easiest personal tax return or the easiest to use and learn"—*PC Magazine*  
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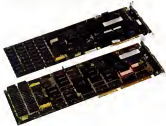
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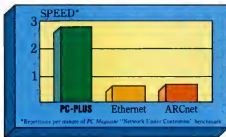
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# MAKING CONNECTIONS

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## The Who, Why, and How of FIBER-OPTIC LANs



**F**iber-optic cables—cables made of glass fibers rather than wire—run many channels of stereo sound to airline passengers' seats, eliminating hundreds of pounds of wiring. Certain automobiles — Chevrolet's Corvette, for one—rely on fiber-optic strands to route light from exterior lights to the driver for monitoring safety conditions. Now even PC-based local area networks (LANs) use fiber-optic cables.

A couple of years ago, the big promise of fiber-optic systems came from their bandwidth. Hundreds of simultaneous telephone conversations or high-speed data transmissions can travel down a single fiber of glass a couple of times the diameter of a human hair. The telephone companies are making good use of

Now PC-based local area networks using fiber-optic cables are both practical and available. Who needs these fiber-optic systems, why do they need them, and how do they use them? The answers will probably surprise you.

FRANK J. DERFLER, JR.

fiber technology in this way as they expand and replace their systems. Most people imagine data moving through these cables at a never-before-possible speed.

But speed is not one of the advantages of PC-based fiber-optic local area networks. The fibers LANs use to hook together PCs are not faster than similar coaxial or even twisted-pair LANs. The packets of data don't travel in parallel through the fiber. In fact, electrical signals move through coaxial cable practically as fast as light travels through glass.

Why, then, are fiber-optic local area networks something to crow about? Because distance and reliability are the primary assets most people value, and because security is equally as important to many users.

## ■ FIBER-OPTIC LANS

**DISTANCE** Signals on a copper cable and light in a glass fiber travel at approximately the same speed, but the light meets less resistance as it moves along. Therefore, light signals go farther with less attenuation. Fiber-optic links from simple PC-based LAN systems can run without a repeater to distances beyond 3.5 kilometers. This distance is more than 11 times the maximum distance of coaxial cable and 15 times the distance of twisted-pair systems such as StarLAN. (Architectural criteria other than the media limit Ethernet networks to 2.5 kilometers overall.)

**RELIABILITY** The primary reason for the reliability of fiber systems is that they don't pick up electrical signals and impulses. Despite shielding, bypassing, and grounding, copper cables become antennas. The longer they are, the more energy from sparking motors, radio transmitters, power wires, and other electrical devices they absorb. Additionally, metal cables can develop different potentials to the electrical ground. This leads to electrical "ground loops" that can induce interference and even sparking from metal cables. The energy from all these sources modifies and smothers the data signals in the metal cable, causing bad packets and sometimes transient unreliability. Fiber cables are immune to all electrical fields, so they carry clean signals and never spark or arc.

The physical topology of fiber LANs also adds to their reliability. All fiber-optic LAN systems use a hub physical topology. This means that cables run from each workstation to a central hub. If one cable breaks, the network remains operational. This is in contrast to station-to-station wiring schemes or even some coaxial hub systems. In these systems, if one cable is shorted or one connector open, the entire network fails.

**SECURITY** Fiber LANs have improved security because they carry light, and that light is precisely controlled. If I can put my hands on a coaxial cable LAN, I can tap into it and read all of the data passing over it, including passwords. Some coupling techniques let me intercept the signals without piercing the cable. This is because copper cables radiate signals as well as pick them up.

Federal agencies recognize the interpretation of radiated signals as a legitimate threat to national security. The Department of Defense and other agencies publish guidelines for the control of emanations under a program called the Transient Electromagnetic Emanations Standard, or TEMPEST. Fiber-optic cables often play a major role in voice and data communications systems approved under TEMPEST criteria because they radiate their light only at the ends of connectors.

If the amount of light going through the cable is precisely adjusted, the insertion of an unauthorized device to tap off some of the light causes the entire link to fail. Failure of the system indicates that something unusual has happened to the cable. Since they don't leak, and it's difficult or impossible to insert a physical tap, fiber-based systems are practically immune to interception.

**WHO'S BUYING?** The people buying fiber-optic LANs, or fiber-optic links for their LANs, aren't necessarily computer scientists and engineers with huge amounts of data to send. Instead, they are likely to be stockbrokers, bankers, medical technicians, and people in the fields of security and intelligence who need extended distance coverage, absolute reliability, and perhaps security for their networks.

Fiber optics has moved quickly from a young technology of great promise to mature practical products with significant advantages over other methods of connecting computers. However, fiber systems bring some unique installation problems, and their costs are higher than alternative systems using copper cables.

**THE PRODUCTS** We examine four fiber-optic systems here—two that extend an otherwise typical copper-wire LAN over longer distances and two that are completely fiber networks. The two systems we review that extend copper-wire LANs are Pure Data's implementation of ARCnet, using fiber to extend the coaxial network, and Proteon's unique ProNET-10 network, using counter-rotating tokenrings for very high reliability. Both of these systems can extend the networks over long distances and through hostile RF environments. The two completely fiber

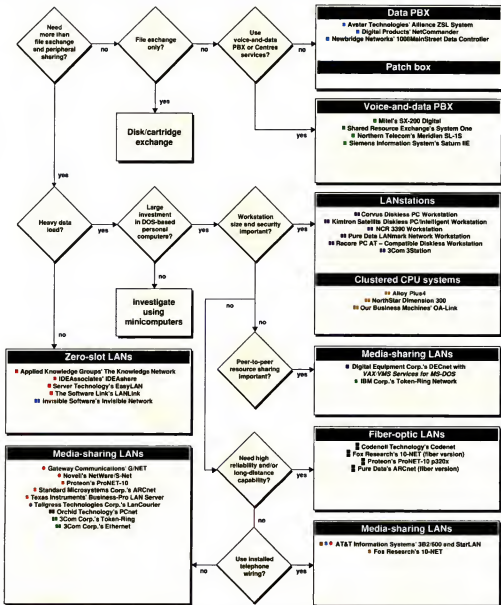
## PC MAGAZINE The Connectivity Decision Guide

This chart is designed to help you select from among the many information-transfer and resource-sharing alternatives. As you can see on the chart, if all you really need to do is exchange files or share printers, then you should consider devices such as PBXs and patch boxes. If your organization has not already invested heavily in PCs or DOS programs, then a minicomputer might meet your needs more economically. But if you want many users to share data files simultaneously under DOS, a LAN may be the best alternative. Once you've decided on a LAN, the need for station-to-station resource sharing and other factors will influence your network purchasing decision.

Because manufacturers include many different features in their networks, some products will not fit neatly into one decision box in this guide. You'll also find that the lack of differentiation between LANs is becoming as large a problem in the LAN industry as the lack of standards was 2 years ago. But overlapping features and technical similarity between networks are good news for potential buyers. They will let you concentrate on more-traditional factors such as dealer support and price instead of on more-technical considerations.

Reviews originally appeared in PC Magazine:

- December 9, 1986
- December 23, 1986
- January 13, 1987
- January 27, 1987
- February 10, 1987
- February 24, 1987
- March 31, 1987
- April 14, 1987
- May 26, 1987
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- September 29, 1987
- October 27, 1987



## OPTICAL COMMUNICATIONS: A TECHNICAL PRIMER

*Basketballs, ocean waves, rifle shot—these are a few of the things that describe how light moves through fiber-optic cable.*

For centuries man has communicated by using light in free space, from signal fires to mirrors reflecting sunlight. But the idea of using light contained in a tube or fiber for communications was born in the mid-1960s. This new technology, just now reaching its maturity, holds great promise for further development.

A fiber-optic cable consists of a light-conducting core and an outer coating called the cladding. The core, made of silica glass or plastic, carries the light. The cladding reflects the light and keeps it inside the core.

Inside the core, the light can bounce around and reflect off the cladding like basketballs in a culvert pipe, flow in harmonious waves like the ocean over a smooth beach, or group tightly like a rifle shot. The name for the bouncing and flowing modes of operation is multimode. The clean shot of light through the pipe is called monomode.

**MULTI AND MONO** Monomode fiber has a higher capacity and can pass data at a faster speed than either of the two multimode types. For example, monomode fiber can carry a 16-channel video system for 15 miles without a repeater. A multimode fiber needs several repeaters for the same capability. But monomode fiber is expensive and difficult to connect.

Since PC-based systems don't need the bandwidth of monomode fiber, these systems use a multimode fiber with step indexing. Step indexing refers to the sharp, steplike difference between the refractive index of the core and the cladding. Multimode fiber is less expensive and easier to install than monomode.

The diameter of the core in multimode fiber is 50 microns or greater. The outer cladding diameter ranges from 100 to 200 microns. A micron is one millionth of a meter. Twenty-five microns are

equal to  $\frac{1}{1,000}$  of an inch, or approximately the thickness of a sheet of paper.

The bare fiber is very weak, so several coats of plastic and a protective braid of Kevlar, a commercial brand-name product, protect it. In some regions, the building codes require a Teflon outer coating for fire protection. These coatings make fiber optic cables look like copper cables, but the cables still weigh only about 11 percent as much as copper cables weigh.

**HOW BIG IS THE CABLE?** The major players in the LAN industry are competing over the size of the fiber core. AT&T specifies fiber with a core diameter of 62.5 microns in its building wiring plans. IBM specifies fiber with a diameter of 100 microns. Obviously, the two specifications aren't compatible.

Coming Glass Works, in cooperation with other manufacturers, proposed a fiber-optic LAN standard called the Fiber Distributed Data Interface (FDDI). An ANSI (American National Standards Institute) subcommittee on the FDDI standard has come up with a preliminary approach specifying a fiber with a 62.5-micron core and 125-micron cladding. Although these specifications are different from the IBM product, the basic architecture of FDDI will be a ring network, much like the IBM Token-Ring Network.

Codenoll supplies a wide range of fiber LAN products. It sells interface cards and hubs with connectors for any standard-size fiber, but you have to know what to order.

In typical PC-based LAN systems, the light in a fiber is transmitted only in one direction, so two separate cables (or two fibers in one outer jacket) connect each network interface card to the hub. The hub is a passive (unpowered) device that combines the light signals by reflecting them off a mirror through a special glass mixer. The Pure Data ARCnet is a

significant exception to the typical dual-cable mode of operation. (See the review of the Pure Data system for more information on full-duplex—single-cable—operation.)

**LET IT SHINE** At each end of the cable, the cable connectors have polished surfaces that let the light shine through. The connectors meet high tolerances so that their polished ends line up exactly for the most efficient transfer of the light.

The ends of the cables must be in perfect condition. Dust caps normally cover their ends when they aren't in use. A single fingerprint on the mirrored end of a connector can reduce the amount of transmitted light by over 60 percent. Installation procedures recommend wiping the end with an alcohol swab before installation.

The laser helped bring fiber-optic cables to maturity by providing a practical and strong source of pure light. In digital fiber systems the light source turns on to represent a 1 and off to represent a 0. The time it takes for a pulse to reach full power is the rise time. Faster rise and fall times allow more pulses per second and faster transmission rates. Lasers have a fast rise time, but laser systems are too expensive.

Light-emitting diodes are fast enough for LAN applications. LAN systems use light-emitting diodes in the hub, and the network interface cards send pulses of light down the fiber to solid-state photo-receptors at the other end.

Buying a fiber-optic LAN involves making some decisions unique to this type of LAN, primarily about the size of the fiber and a few specialized installation problems like making connections. But modern fiber LAN packages make it easy for you to use a sophisticated technology that offers reliable connectivity under difficult conditions.

—Frank J. Derfler, Jr.

networks we review in this issue are the 10-NET system, from Fox Research, and Codenet, an Ethernet system from Codenoll Technology.

**THE CONCEPT** In a token-passing ring network, a stream of data circulates through the network stations. One short token is not accepted by a station, held, and then passed on. Instead, the stream of bits that makes up a token or a message might pass through several stations simultaneously. This streaming of data makes Token-Ring networks better suited to optical media than are broadcast-type systems like Ethernet or ARCnet. Optical media typically carries one-way transmission, and the token travels in only one direction around the ring, so there is no need for optical mixers that divide power or for expensive active repeaters.

Copper cable Token-Ring systems use a wire center (hub) housing electromechanical relays. When a station tries to join the ring, a voltage goes through the cable and activates the relay. The relay reconfigures the ring in milliseconds and adds the new station. If the cable from the station breaks or shorts out, or the station loses power, the relay opens and the station drops out. This prevents one bad cable from taking the entire system down. The fact that one bad cable can't disrupt the entire system is a major selling point for Token-Ring, ARCnet, and StarLAN systems using a physical hub topology.

Even though the hub topology improves the chances of the survival of the network, it does nothing to help restore service to a station with a disrupted cable. If a node (workstation, gateway, or server) or a group of nodes is hundreds of feet from the hub, their connections become more vulnerable as their cables become longer. The tines of a forklift or the beater bar of a vacuum cleaner can break the cable and drop stations out of the ring.

**EASY INSTALLATION** Our experiences show that anyone who can install a regular coax or twisted-pair-wire LAN can install a fiber LAN with preattached connectors with about 1 minute of additional training (see the accompanying sidebar

## FIBER-OPTIC CABLE: HANDLE WITH CARE

*Here are some Dos and Don'ts to observe when handling fiber-optic cables—a quick primer on how to attach these LAN connectors.*

### Dos

- Do wipe the ends of the cable connectors with an alcohol swab. Fiber-optic cables may be fragile, but that doesn't mean they don't need to be cleaned.
- Do check for alignment sleeves if they are used inside the connectors on your system.
- Do follow the color codes on the cables to make sure the ports are connected correctly.

### Don'ts

- Don't touch the end of the connectors.
- Don't bend the cable at more than a 90-degree angle. (A bend that would result in a circle with about a 6-inch diameter is OK, though.)
- Don't loosen the dust covers from the cables and the chassis connectors.
- Don't overtighten the connectors. Use your fingers, never a wrench.

—Frank J. Derfler, Jr.

needed, then a day's training on attaching connectors to fiber is in order.

Fiber networks are no longer mysterious high-tech curiosities. Now you can move your data by light relatively easily. The following products attest to the light fantastic of fiber-optic technology.

### CODENOLL TECHNOLOGY

#### Codenet

Unlike the other companies whose products we reviewed, Codenoll Technology sells only fiber-optic products. The company makes and markets a wide range of fiber products, ranging from individual LEDs, cables, and connectors to repeaters and network interface cards for PCs.

We reviewed the Codenet network interface cards that emulate the 3Com EtherLink cards and use the Ethernet CSMA (carrier sense multiple access) connection scheme. Codenoll also markets network interface cards using fiber that emulate Token-Ring and ARCnet network interface cards. Since NETBIOS is available for the Codenoll network interface cards, they run with NETBIOS-compatible software.

**PARTS OF THE SYSTEM** The Code-



## FACT FILE

**Codenet**  
Codenoll Technology  
1086 N. Broadway  
Yonkers, NY 10701  
(914) 965-6300

**List Prices** Codenet 3051 PC network interface card, \$995; Codestar Passive Optical Star Coupler (8-port), \$2,495; 100-micron fiber-optic cable with connectors, \$184 for 10 meters, \$230 for 20 meters, \$360 for 50 meters.

**In Short:** A completely fiber-optic LAN, this system has networking cards that are compatible with a wide range of networking software; the cards emulate the 3Com EtherLink cards and use the Ethernet CSMA connection scheme.

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cards (\$995), the fiber-optic cable, and the Codestar Passive Optical Star Couplers (\$2,495). Networking software from 3Com, Novell, or Banyan—or any other software that is capable of driving a 3Com 3C501 network interface card—runs on this system.

The Codenoll Codenet 3051 cards are full-size circuit boards. These cards, man-

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- Clock/calendar with 10-year battery life
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- 80287 support, hardware selectable at 6, 8, 10 or 12 MHz



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Basic system, plus 12" high resolution monochrome monitor and Hercules compatible graphics card.

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- Proprietary system board
- 2 serial ports, 1 parallel port, joystick adaptor
- Clock/calendar with 10-year battery life
- 80287 support, hardware selectable at 6, 8, 10 or 12 MHz

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## ■ FIBER-OPTIC LANS

3Com 3C501 coaxial network interface cards. You can even run the 3Com diagnostic software against the card.

The Codenet 3051 contains the 3C501 electrical interface, an optical receiver, optical collision detection logic, and optical connectors on the back of the board. The board has a socket for an Etherstart remote PROM for use in diskless workstations that boot from the server.

Jumpers set the DMA (direct memory access) level, interrupt number, and I/O address on the Codenet board, just as they do on the 3Com board. Normally, these settings work on any PC. If you change them, remember that you must change the software too.

A green LED mounted on the back of the external connector flashes in time to the activity of the fiber-optic circuitry. This kind of indicator can help you troubleshoot problems you may have with cables, cards, or software.

The Codenet boards also have jumpers that make it easy to isolate problems between the electrical and the fiber-optic systems. You can loopback the electrical and optical circuitry separately and run tests on the various components. Some tests of the fiber system require a special optical power meter.

Codenoll offers a choice of 50-, 62.5-, 85-, or 100-micron core graded index fiber in its systems. The typical fiber used in PC-based networks has a 100-micron core. Design factors, such as the length of the longest run, determine the kind of fiber and the wavelength of the LEDs and photodiodes. Codenoll sells 100-micron core cable with connectors in lengths from 10 to 1,000 meters (10- to 50-meter cable, for example, runs \$184 to \$360).

Codenoll calls its optical hub the Codestar Optical Star Coupler. This device is available in models able to connect 2, 4, 8, 16, 32, or 64 nodes without the use of repeaters. The hubs are typically flat devices about 2 inches high that can fit into standard 19-inch equipment cabinets or their own cabinets.

The Codestar couplers are entirely passive devices. The passive (unpowered) aspect of the hub increases its reliability. Inside the coupler, fused fibers form an unpowered optical mixer. Any light sent into a fiber divides equally among all of the

fibers. The maximum length of cable running between a PC and a hub is 1 kilometer. Powered repeaters can increase this distance significantly.

Networks larger than 64 nodes are constructed with multiple Codestar couplers interconnected to up to two other couplers. However, in the Codenoll system it is necessary to use a powered optical repeater between the hubs to regenerate the optical signal. Many combinations of couplers and repeaters can provide service to a theo-

---

■ The Codenet boards have jumpers that make it easy to isolate problems between the electrical and the fiber-optic systems.

---

retical maximum of 260,000 PCs and servers. The network would most likely suffer significant delay and distance problems before reaching this theoretical number, but networks of hundreds of nodes are practical.

**DISTANCE** How far can you push a fiber-optic Ethernet network? Unfortunately, the design of the access protocol limits the overall length of cable in an Ethernet network. The light beam provides a useful signal at distances much farther than the access protocol allows.

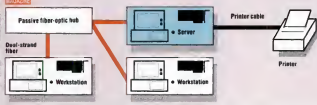
According to the Ethernet IEEE 802.3 standard, no two nodes can be more than approximately 2.5 kilometers (1.5 miles) apart. The CSMA collision detection scheme requires that when the shortest possible packet travels through the network at nearly the speed of light, the most distant station should receive the beginning of the packet before the end of the packet is sent. The speed of the signal through the media varies a little among different types of coaxial and fiber cables, but 2.5 kilometers is a practical estimate. If you want to go beyond this distance with





## Codenoll Technology's Codenet Topology

(Media: Fiber-optic cable)



Codenoll's Codenet 3051 network interface cards each attach to a central passive hub through two fiber-optic cables. Light is split inside a bundle of fused fibers in the hub and transmitted to all stations. The networking cards are compatible with a wide range of networking software.

an Ethernet system, you have to establish a second network and install a bridge between them.

**INSTALLATION/OPERATION** Aside from taking the precautions necessary for any fiber-optic installation (don't touch the ends of the connectors and don't overtighten them), anyone who can install a 3Com EtherLink card can install the Codenoll fiber-optic Ethernet system. We used the cards with both 3Com and Novell software.

Codenoll cautions you to check that the small plastic alignment sleeves are inside every female fiber-optic connector. These sleeves ensure the alignment of the connectors and reduce light losses, but they can fall out when you handle the cards. You can look inside the connectors with a flashlight, but the easiest way is to try to put in another sleeve. If one is already in there, you won't get another one in.

The benchmark tests for the Codenoll system show that the fiber-optic network interface cards are true to their 3Com heri-

tage. They perform very well, particularly on a lightly loaded network. As the contention on the network increased, our timed tests showed degradations in performance greater than those shown with the coaxial-cable 3Com cards. Our tests indicate again that the benefit of using fiber-optics is not improved throughput under normal conditions. Again, choose fiber for reliability and distance, not necessarily for speed.

**BOTTOM LINE** The Codenoll line of network equipment provides either a link between coaxial and fiber networks or totally fiber LANs. The equipment is easy to use and install and Codenoll provides all the pieces except the networking software.

### FOX RESEARCH INC.

## 10-NET

In our previous review of the 10-NET local area network from Fox Research, we identified it as a system with many features and a lot of value for the money (*PC Magazine*, February 10, 1987). Standard 10-NET connects the network interface cards in a bus wiring scheme, with cable taps, boxes, and drop cables at each individual station. The system uses twisted-pair telephone wire.

The 10-NET software lets any station on the network provide resources like disk drives or printers to the network. The software works with DOS (unlike the unique server software of *NerWare*, *VINES*, and other systems) and is compatible with all backup and add-on storage devices. In our

previous review we praised the features, ease of use, cost, and ease of installation of this system. Although 10-NET didn't burn up the track in our benchmark tests, it is reliable and well suited to an office environment.

The folks from Fox Research now offer fiber-optic alternatives to their twisted-pair LAN. Totally fiber 10-NET and 10-NET systems that mix twisted-pair and fiber are available. LAN planners specify totally fiber systems for environments with a lot of electrical interference or where they need high reliability. The mixed twisted-pair and fiber systems combine the low cost of twisted-pair with the ability to make a long run to a station or another hub up to a mile away.

**10-NET PARTS** The parts of the 10-NET fiber system include the \$895 network interface card, fiber cabling, and the \$1,995 repeating hub. The same 10-NET networking software runs on fiber and twisted-pair network interface cards, but you need Version 3.2 or later of the 10-NET software for the fiber-optic cards.

The 10-NET fiber-optic network interface card is nearly identical to the twisted-pair card. It has the same half-size configuration and even retains a twisted-pair connector as an alternative to the on-board fiber transmitter and receiver.

Fox Research demonstrated a NET-BIOS interface for its cards in Europe, but the cards we tested respond only to the Fox 10-NET networking software. A NET-BIOS interface allows the use of many net-



## FACT FILE

### 10-NET

Fox Research Inc.  
7016 Corporate Way  
Dayton, OH 45459-4223  
(513) 433-2238

List Price: 10-NET FiberLAN network interface card, \$895; 10-NET FiberLAN network hub, \$1,995.

In Short: This completely fiber optic LAN uses a physical hub to which each node is connected by a pair of fiber-optic cables; the software allows stations to act in both workstation and server.

CIRCLE #19 ON READER SERVICE CARD

■ Our tests indicate that fiber-optics should be chosen for reliability and distance, not speed.

## ■ FIBER-OPTIC LANS



*A small, powered fiber-optic hub is in the Fox Research system. Fox's fiber cards retain the ability to use twisted-pair wiring, giving flexibility to LAN planning.*

work application programs, such as electronic mail packages, that use NETBIOS to establish sessions between stations. The NETBIOS interface for all Fox Research products should be available before you read this review.

Fox Research doesn't normally provide the fiber-optic cable for these systems. The company maintains that people typically have fiber installed by companies specializing in this business. You can special-order fiber-optic cables with connectors attached from Fox Research; allow a 2- to 3-week period for delivery.

The cable Fox Research recommends uses a 100-micron core with a graded index. The connectors, Augat DSC/61120, are the equivalent of the AMP 905 series of connectors. After the connectors are bonded to the fiber (a job for specialists), you can easily attach them and remove them from the network interface cards and hubs.

The fiber-optic hub that 10-NET uses is only about 5 inches wide, 4 inches high, and 4 inches deep. The hub is available both as a hub for fiber connections and as a translator able to link twisted-pair cabling to a single fiber run. The 10-NET hub requires 110-volt power, and it completely regenerates the signals it receives.

Each fiber hub connects up to eight PCs and provides one connection to daisy-

chain to other hubs. If you need to connect many PCs, you can build a pyramid of hubs. In this kind of pyramid, the first hub connects to eight others. Each of these eight hubs connects to eight more. These three levels of hubs can then provide connections for up to 512 nodes.

The pyramid process makes it very easy to link clusters of workstations together even if the clusters are located several thousand feet apart.

**ACCESS PROTOCOL** The 10-NET fiber system uses the CSMA (carrier sense multiple access, or listen-before-transmit) protocol, as does the twisted-pair version. But because these systems transmit on a cable separate from the one they receive on, the hubs must play an active role in the CSMA scheme. If two or more PCs transmit at the same time, the hub generates a unique message called the Collision Presence signal. When they receive this signal, the transmitting PCs back off, wait, and try again when the channel is clear.

**DISTANCE** The distance between a 10-NET station and its fiber hub or between two fiber hubs is set in two ranges. The first range spans a few feet to 1 kilometer. The second range is from 1 to about 1.6 kilometers (1 mile).

The first range is the normal mode of operation. Changing a resistor in the hub (you can do it with pliers and some dexterity) increases the power of the LED transmitter for the longer run. However, if you use the higher power on shorter runs, you might overload the receiver.

Because you must prearrange things like the power level and types of connectors and because fiber-optic cable costs more than coaxial cable, you must plan fiber-optic systems even more carefully than coaxial systems.

**INSTALLATION/OPERATION** The job of installing 10-NET system hardware consists primarily of checking the configuration of the cards and connecting them to the fiber. The cards come with default settings for the interrupt request line, I/O address, and DMA (direct memory access) channel used by the card. Statements in a software script file change these settings; you don't have to fumble with jumpers on the cards.

Normally you take the cards from the box and insert them into the PC without

### ■ If you need to connect many PCs, you can build a pyramid of hubs with 10-NET.

any change in their setup. The fiber-optic cables are color coded. You follow the codes and screw in the fiber connectors at the hub and card ends.

The complexity of the 10-NET software installation depends in large part on the resources shared with the network and the degree of security required by the user. Script files read by the 10-NET program determine the capabilities and access rights of a 10-NET user. You edit the individual's script with a text editor and then you can change everything from the DMA level used by the interface card to file access rights. If you understand how this system works, you can arrange user profiles in less than 2 minutes.

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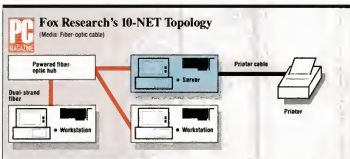
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## ■ FIBER-OPTIC LANS



*Fox Research's 10-NET fiber system uses a physical hub. A pair of fiber-optic cables connects the hub to each node. The Fox software allows stations to act as both workstations and servers on the network.*

**PERFORMANCE** Our testing shows that 10-NET using fiber-optic cable performs almost exactly as 10-NET using twisted-pair wiring. The fiber doesn't make a significant difference in the speed of the system. The speed of the serving hard disk drive and the design of the networking software are still the two most important factors in determining performance.

Because MS-DOS is not a multitasking system, networks that allow computers to simultaneously act as both a server and a workstation—like 10-NET, TOPS, and IBM's PC Network—must divide the time of the processor. Typically, they provide slower service than network operating systems that dedicate a server's resources, such as 3Com's 3+Share and Novell's NetWare. Using new, fast 80286 and 80386 processors, however, restores power that is sliced away by network operating systems, and MS-DOS/2 promises true multitasking operation.

**BOTTOM LINE** The future of shared-resource systems like Fox Research's 10-NET looks bright.

### PROTEON INC.

#### ProNET-10 p320x

Proteon makes classy high-end network hardware. For example, the Proteon ProNET 4 network is totally compatible with the IBM Token-Ring Network, but Proteon adds some significant flexibility and troubleshooting features to IBM's

rather conservative design. You would expect Proteon to market an impressive fiber-optic system, and it does: the ProNET-10 p320x counter-rotating ring system.

Proteon offers point-to-point fiber repeaters to extend copper-wire-based LANs, as well as all-fiber LANs. The system we evaluated uses redundant runs of fiber-optic cable between elements of the network in a configuration called a counter-rotating ring, offering significantly improved reliability.

The counter-rotating ring system isn't just more reliable because it uses redundant cables. It is also self-sealing and self-healing in the event of multiple failures. So if you are planning a network for a hospital, processing plant, stock trading floor, or nuclear power plant—in other words, if your system must work despite physical disruption—the ProNET-10 p320x deserves consideration.

The Proteon counter-rotating ring system (\$1,700 for the counter-rotating fiber controller) focuses on improving the reliability of this long-distance LAN connection. It lets the hub do its job for the network while improving the odds of the distant nodes reaching the hub.

The ProNET-10 p320x system uses a standard ProNET wire hub (\$630) and network interface cards with copper cable attachments (\$545; \$595 for AT cards). However, instead of attaching the cards to the hub, the connection from the cards goes to a Proteon p3200 fiber-optic interface that is about the size and shape of a modem.

■ Proteon has added a security benefit to the ProNET-10 p320x—you can adjust the level of the light transmitted from each p3200 with an internal switch.

The p3200 interface translates between the copper cable and two separate fiber-optic paths (four fiber cables). Ten meters of cable cost \$200, plus \$3 per meter. Each p3200 has a microprocessor (Intel 8749) that monitors the connectivity through the fiber links. A Proteon network accepts up to 63 p3200 devices, and each one can be up to 2.5 kilometers from its farthest neighbor. Devices attached to workstations have different options selected than do devices attached to a hub, but they operate in the same way. The p3200s shake hands and identify each other.

As an added benefit to the security of the system, you can adjust the level of the



## FACT FILE

### ProNET-10 p320x

Proteon Inc.  
Two Technology Dr.  
Westborough, MA 01581-5008  
(617) 898-2800

**List Price:** ProNET-10 p1300 network interface card, \$545; ProNET-10 p1303 IBM PC AT network interface card, \$595; ProNET-10 p2412 8-Node wire center, \$630; ProNET-10 p3200 counter-rotating fiber controller, \$1,700; ProNET-10 p3903-10 100/140-micron fiber cables, \$200 for 10 meters plus \$3 per meter.

**In Short:** A fiber-optic system that extends an otherwise typical copper-wire LAN over longer distances and through hostile RF environments, this complex system is highly reliable.

CIRCLE 699 ON READER SERVICE CARD

## ■ FIBER-OPTIC LANS

light transmitted from each p3200 with an internal switch. If this level is low enough, unsophisticated attempts to tap the fiber will cause the system to fail.

Each p3200 monitors the activities of units to its "right" and "left" on the loop. It can take several actions in response to disruptions of the connections between units. If one fiber path between p3200s becomes open, the devices signal each other and switch to the secondary path. Lights on the front of the p3200 show the selection of the secondary path. You can extend the light panel of each device to a central point for network management and maintenance.

A variety of damage conditions can exist for any node in a network. Both routes in one direction can be out, different routes can be open in different directions, or only one route in one direction might be open. In all of these conditions, the p3200 devices will patch together cable routes internally to communicate with the greatest number of other p3200 units. The total network can suffer a great deal of damage and still survive.

If the combined efforts of the p3200 units cannot recreate the entire network, the units will break the system into the parts to which they can talk. If only two stations remain in touch, they form their own ring. In a practical sense, the residual elements of a network might not have any resources (drives, files, ports, printers) that can be useful to one another. The introduction of true multitasking operating systems and greater processing power in workstations, however, makes it more likely that surviving nodes will have resources they can share to do useful work.

In addition to being self-sealing, the system is also self-healing. If connections are restored, the p3200s notice the new path and reestablish the network in order to include it.

**CABLES AND CARDS** Proteon specifies optical fiber with a 100-micron core and SMA type 905 connectors for connections between the p3200 units. The company sells the fiber in various lengths with connectors attached. Fiber with a 50- or 62.5-micron core is available by special order.

The network interface cards Proteon



*This photo of the Proteon system shows the connections for three nodes on the fiber-optic counter-rotating ring. The network interface cards are on top of the p3200 devices, which are connected by gray fiber-optic cable. A hub for the copper cable is in the center. The white connectors, which come from the power supplies for the p3200 devices, carry both signals and power.*

sells include versions for both XT- and AT-style machines. Proteon also markets interfaces for Digital Equipment Corp.'s Unibus and Q-Bus and Intel's Multibus.

The p1303 ProNET 10 IBM PC AT network interface cards operate in comput-

their bus speed to 8 MHz to ensure compatibility with existing peripherals. We didn't try these cards on a machine with a faster bus, but Proteon promises a noticeable increase in I/O rate and throughput when using such equipment.

■ For a variety of damage conditions, Proteon's p3200 devices will patch together cable routes to communicate with the greatest number of units.

ers with bus (not CPU) clocks running at speeds up to 16 MHz. The best example is the PC's Limited 286/12. Most 80286 and 80386 machines with CPU clocks faster than 8 MHz (like the Compaq 386) limit

**INSTALLATION** As the accompanying photo shows, this system has a lot of wires and cables. Installing the system is a job for someone who can read diagrams. Pre-planning every step is necessary because factors such as the limited distance allowed between the node and the p3200 device can surprise you. The power cable for the p3200 also carries the signals between the p3200 and the node, so you have only a limited span between them.

Our biggest complaint, however, comes from the size of the power supplies for the p3200s. These power supplies are supposed to plug into a wall socket, but they are huge. If you are using a four-socket outlet or a power strip, you will lose many outlets to these monsters. Using in-line transformers with a cord would be a more practical and attractive method.

## ■ FIBER-OPTIC LANS

### TESTING THE ALTERNATIVES

Aside from testing the throughput of the systems reviewed here, we also checked what happened if we unplugged fiber-optic cables to simulate an outage. Unscrewing

■ With the Proteon system, unscrewing a fiber-optic cable to simulate an outage produced no hesitation in network operation that we could detect.

a cable in this case produced no hesitation in network operation that we could detect. The lights on the p3200 interface showed a change in configuration, but data kept flowing. We didn't have enough fiber units to let the system break into two parts, but the one segment that could talk to another surviving p3200 reconfigured the system for network and workstation survival.

We ran a timing test of the Proteon system with the fiber p3200 units installed and with direct copper connections. We were not able to measure any degradation between the fiber and copper alternatives. Overall, the Proteon system showed very fast response times.

**BOTTOM LINE** The ProNET-10 p320x system is not inexpensive. But if you have a requirement for a network covering a lot of geography and/or one that must remain operational despite minor-to-major damage to its pieces, the Proteon system is your best chance for success.

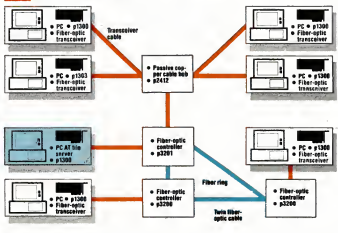
### PURE DATA LTD.

#### ARCnet

Pure Data has been a leader in the innovative design of products related to ARCnet local area network systems. In "Equipping Your Network: The LANstation Al-

### PC Proteon's ProNET-10 p320x Topology

(Media: Fiber-optic and copper cable)



The ProNET-10 p320x is a complex system providing high reliability. The majority of the system uses copper cables. Each workstation has a separate run of cable going to a central hub. The hub has lights showing the status of the station, and the cables and switches allow exclusion of stations from the ring. For extension of the network over longer distances or where high reliability is needed, redundant fibers interconnected by the p3200 control units are used. The p3200 units monitor the status of connections to their "left" and "right" in the ring. If one cable connection fails, they use alternate communications paths to restore the ring or to at least communicate with the maximum number of stations.



### FACT FILE

**ARCnet**  
Pure Data Ltd.  
1740 Route 1-35 South, #140  
Carrollton, TX 75006  
(214) 242-2040

**List Price:** PD508F1 half-duplex fiber-optic ARCnet card, \$995; PD508F2 full-duplex fiber-optic ARCnet card, \$1,295; PD508AF1-1 ARCnet active hub (7 ports coaxial, 1 port half-duplex fiber), \$1,395; PD508AF2-1 ARCnet active hub (7 ports coaxial, 1 port full-duplex fiber), \$1,695.

**In Short:** A fiber-optic system that can extend a standard copper-wire LAN over greater distances and through unfriendly RF environments. This impressive system has lights that signal the status of the cables, cards, and indirectly, the software.

CIRCLE 181 ON READER SERVICE CARD

ternative" PC Magazine, May 26, 1987, we evaluated the Pure Data LANmark Network Workstation. Another of the company's innovative products is a combination ARCnet network interface and EGA video system on a single PC expansion card.

Although Pure Data markets network systems using only fiber-optic cables, for this evaluation we asked them to provide an ARCnet network with a mix of fiber and coaxial cable. We wanted to illustrate how easy it is to mix these media for economy and to test for performance differences.

**ARCNET** The Attached Resource Computing Network (ARCnet), developed by Datapoint, was one of the first local area network systems to reach the market. ARCnet systems consistently are top performers in our benchmark tests. Some pundits say that if Datapoint had not tried





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CIRCLE 388 ON READER SERVICE CARD

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## Benchmark Tests: Fiber-optic LANs

These results support the conclusion that the benefit of using fiber-optic cabling is not in improved throughput under normal conditions. ARCnet, from Pure Data, and ProNET-10 p320x, from Proteon, both combine copper cable and fiber-optic cable. In both cases, the fiber-optic cable was used in the link between the wiring hub and the server. There was no significant difference in performance when the fiber-optic link was replaced with copper cable. Overall, the ProNET-10 p320x showed very fast response times.

Our tests of Codenot's Codenet system showed that the fiber-optic interface cards perform well, especially under a light load. As contention increased, the tests showed degradation in performance greater than that

shown with coaxial cable EtherLink cards under 3+ Share on a 3Server3. Fox Research's 10-NET system using fiber-optic cable, which was the slowest of the systems tested, performed almost exactly like 10-NET using twisted-pair cabling. In this case, such factors as the speed of the serving hard disk and the design of the networking software are more important determinants of the network's speed than is the use of fiber-optic cabling. Networks like 10-NET that allow computers to act as both a server and a workstation must divide the time of the processor. As a result, they are usually slower than network operating systems that dedicate a server's resources, such as 3+ Share and Advanced NetWare/286.

### Network Speed Under Load

| Server          | Interface card  | Software             | Zero stations | One station | Two stations | Three stations | Four stations |
|-----------------|-----------------|----------------------|---------------|-------------|--------------|----------------|---------------|
| 8-MHz IBM PC AT | Codenet         | Advanced NetWare/286 | 295           | 468         | 614          | 811            | 922           |
| 3Com 3Server3   | EtherLink       | 3+ Share             | 306           | 432         | 529          | 651            | 761           |
| 8-MHz IBM PC AT | ARCnet          | Advanced NetWare/286 | 389           | 422         | 448          | 465            | 505           |
| 8-MHz IBM PC AT | ProNET-10 p320x | Advanced NetWare/286 | 345           | 352         | 377          | 380            | 395           |
| 8-MHz IBM PC AT | EtherLink       | Advanced NetWare/286 | 264           | 260         | 301          | 310            | 322           |
| 8-MHz IBM PC AT | 10-NET          | 10-NET               | 554           | 874         | N/A          | N/A            | N/A           |

### Hard Disk Access Load

| Server          | Interface card  | Software             | Zero stations | One station | Two stations | Three stations | Four stations |
|-----------------|-----------------|----------------------|---------------|-------------|--------------|----------------|---------------|
| 8-MHz IBM PC AT | Codenet         | Advanced NetWare/286 | 137           | 293         | 523          | 670            | 782           |
| 3Com 3Server3   | EtherLink       | 3+ Share             | 155           | 227         | 330          | 419            | 522           |
| 8-MHz IBM PC AT | ARCnet          | Advanced NetWare/286 | 195           | 233         | 271          | 310            | 363           |
| 8-MHz IBM PC AT | ProNET-10 p320x | Advanced NetWare/286 | 161           | 185         | 213          | 236            | 251           |
| 8-MHz IBM PC AT | EtherLink       | Advanced NetWare/286 | 136           | 150         | 162          | 174            | 182           |
| 8-MHz IBM PC AT | 10-NET          | 10-NET               | 253           | 944         | N/A          | N/A            | N/A           |

N/A—Not applicable: because of its production schedule and our deadline schedule, Fox Research was able to provide only three 10-NET interface cards for testing.

The PC Lab LAN benchmark tests are written in C and are independent of commercial software. We ran the tests on a test bed of five 8-MHz IBM PC ATs. For our test bed to better simulate the conditions on a medium-size network of 20 or more workstations, we have designed these loading tests so that a single station represents five to ten times the load of a user performing an interactive task (for example, updating records) on a network.

By themselves, the elapsed times reported in these tests are not meaningful. They are valuable only when used to

compare the performance of two or more systems running under near-identical conditions. Accordingly, we include the tests run on our Editor's Choice configuration of a 3Com 3Server3, 3+ Share software, and EtherLink interface cards to provide a point of comparison. We also show results from a network of Novell's Advanced NetWare/286, EtherLink cards, and an IBM PC AT as the server. Advanced NetWare is our Editor's Choice for networking software, and our tested configuration is a typical one.

The Network Speed Under Load and the Hard Disk Access

Load benchmark tests measure the time needed to perform a standardized task on the network. While the actual work loads used for these two tests (described below) are different, we used the same procedures for both. To obtain the elapsed times shown here, we ran a benchmark program performing a sequential create, a sequential write, a sequential read, a random write, and a random read of a large file. The record sizes used in these activities systematically rotate between 10K, 4K, and 512 bytes. The numbers shown in the three-dimensional chart are the total time necessary for all of

to keep ARCnet a proprietary system in the beginning, Ethernet's growth would have been severely limited.

ARCnet uses a token-passing protocol (very different from that of the IBM Token-Ring Network) to control access to a system configured as an electrical bus. Up to 255 stations can connect to the bus.

The classic ARCnet configuration uses a central hub physical topology. An alternative station-to-station physical topology for ARCnet is available from Standard Microsystems. This topology reduces the cost of the installation, but it also eliminates the reliability and troubleshooting features that come with a hub system.

Pure Data's ARCnet hardware works with Novell's NetWare, Banyan's VINES, Tiara's TiaraLink, and Davong's Multilink networking software.

**ONE CABLE OR TWO?** Pure Data sells two types of ARCnet interface cards for fiber-optic systems (\$995 and \$1,295), two hubs (\$1,395 and \$1,695), and the fiber-optic cable needed for these systems.

The Pure Data ARCnet network interface cards and hubs are available in either two- or one-cable models. The basic model of the card is the PD11508, and the model of the hub is the PDC508A. You add F1 to the model number for full-duplex (one

cable) and F2 for half-duplex (two cables).

The typical two-cable fiber LAN uses optical transceivers operating on the same wavelength. The light beams travel in separate cables until they optically combine in a passive (unpowered) hub.

A half-duplex system uses light beams of different wavelengths at each end so they can ride in the same light pipe without conflict. This makes the cabling simpler but complicates the optoelectronics. The trade-off comes in paying for devices on the interface card and in the hub or in paying for more cable. Typically, cable costs less because using different wavelengths in a single-cable system means you must

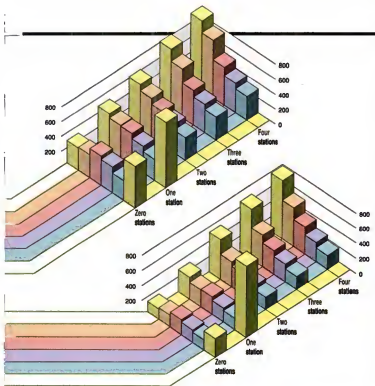
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these operations. We ran the test on all our ATs to load the network while timing just one of them. We then reduced the number of workstations one at a time to show the effect of loading on the network.

The Network Speed Under Load test puts a heavy load on the network interface (cards, media, and so forth) while placing a minimal load on the hard disk by having each station continuously read and write its own 1-byte data file, changing the data each time. For systems with disk caching, the load on the hard disk is even smaller, since cached systems typically

perform a disk write but do not require a physical disk read.

The Hard Disk Access Load test heavily loads the hard disk and disk-caching system. To do this, each station randomly accesses its own 100K data file using 1K records. Data written to the file is changed each time. The random reads typically access data outside the cache, which forces a disk read, so does any write.

have an active (powered) hub with repeating transceivers. But ARCnet systems use a powered hub anyway, so the cost equation tips toward a single fiber with dual-wavelength optical transceivers.

Pure Data recommends a single fiber with dual-wavelength transceivers for cable runs of up to 1 kilometer. Above this distance, it recommends pushing more power through two cables operating with simpler single-wavelength transceivers. This combination can transmit up to 3.5 kilometers without a repeater. The token-passing ARCnet access protocol is not inherently distance-limited like the Ethernet CSMA/CD (carrier sense multiple access

with collision detection) protocol.

You can install a single piece of fiber to each node and pay a little more for the equipment, or pay less and pull two pieces of fiber cable to each location. At some point there will be a crossover of cost and little or no difference in operation.

**SYSTEM PARTS** An electronics designer can make certain minor improvements or additions to a system that can help the installer and system administrator. Pure Data's designers typically perform this service. The ARCnet network interface cards (both coaxial and fiber), for example, have two LEDs on them that are

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96

## ■ FIBER-OPTIC LANS

■ The ARCnet network interface cards have two LEDs on them that are useful for diagnostics.

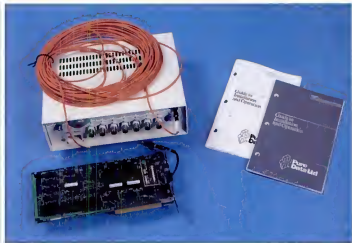
useful for diagnostics. You can tell by looking at the back panel if a token is being passed through the network and if the workstation responds to the token.

The ARCnet hub has similar LEDs for the coaxial connections that show continuity of the cable between the hub and the node. Using these simple displays, you can quickly spot a cabling problem or a bad network interface card.

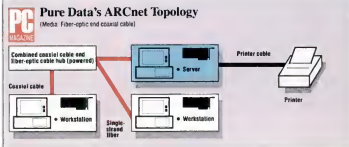
Another design plus is the placement of the switches needed to configure the network interface cards. Each card in an ARCnet system must have a unique node address. The address is set into a DIP switch somewhere on the card. If the network administrator doesn't keep a record of the addresses, he must typically pull every card from its PC and read it. The node ID switches on the Pure Data cards are accessible through the rear bracket. You can read or change the ID without taking the cover off the PC and removing the card. DIP switches along the top edge of the network interface card allow you to set the I/O address interrupt level (direct memory access is not used) without taking the card out of the PC.

The Pure Data active ARCnet hubs are available in versions with one fiber port and seven coaxial ports, two fiber and six coaxial ports, eight coaxial ports, or eight fiber ports. The hub itself is a box about 10 inches wide, 3 inches high, and 8 inches deep. It requires AC power.

Pure Data sells fiber-optic cable in various lengths for its systems. The company specifies 200-micron step index fiber for full-duplex (single-cable) operation and 100-micron cable for half-duplex systems.



The powered hub for the Pure Data ARCnet system accommodates a variety of fiber-optic and coaxial-cable connections. The single fiber-optic cable uses dual-wavelength signaling to share the fiber.

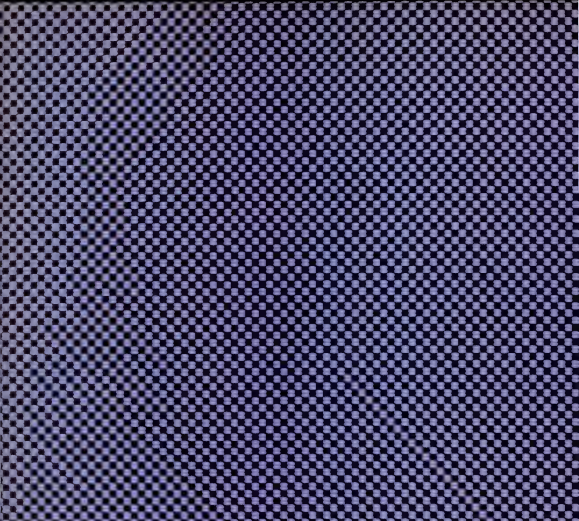


The Pure Data ARCnet system combines fiber and coaxial cables inside a central powered hub. For distances of up to 1 kilometer, Pure Data specifies a single fiber. The hub and interface cards have lights that signal the status of the cables, cards, and indirectly, the software.

systems build your confidence as you move through the installation. A light tells you the cable is OK, and another light tells you the card is OK. Another light flashes when the software activates the card so that you know that interface is OK. The system almost has to work.

In our timing tests the Pure Data ARCnet system worked very well. We ran the

**BOTTOM LINE** We were impressed with the design features and performance of the Pure Data ARCnet network. The people at Pure Data put thought into giving you flexibility in your network planning and making it easy to install and maintain their hardware. If you are starting LAN planning from scratch or expanding an ARCnet LAN, you should consider the



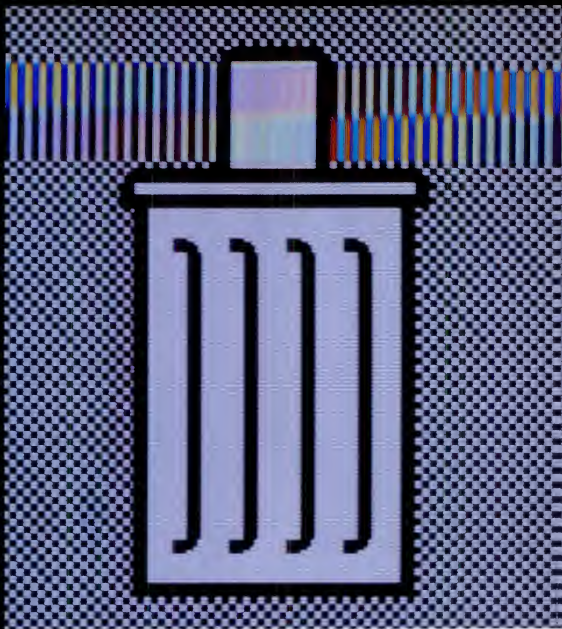
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|                      | SI   | Sieve<br>MS C (sec) | Shuttle<br>Regen (sec) | Price |
|----------------------|------|---------------------|------------------------|-------|
| PC                   | 1.0  | 5.88                | 100 (12)*              | -     |
| 9 MHz FastCACHE-286  | 7.1  | 1.32                | 28 (7)*                | \$349 |
| 12 MHz FastCACHE-286 | 10.3 | .93                 | 22 (6)*                | \$599 |

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# TANDY'S 1000 HX & TX: RATED PG

*Tandy's new, enlarged PC family now includes the 8088-based 1000 HX and the 80286-based 1000 TX. For the first-time user or the person shopping for an AT compatible, the two machines are bargain-priced, made-in-the-U.S.A. alternatives.*

In the past year, the microcomputer industry has been overtaken by a storm of new product announcements. It seems as though all product lines in all companies even remotely connected with the computing industry have proliferated geometrically.

In that flurry we've had the introduction of the PS/2 machines from IBM, dozens of XT and AT clones, another dozen low-profile compatibles, a half dozen new laptops, and what seems like hundreds of new printers.

Somewhere in the middle of this profusion of hardware are several new offerings from Tandy Corp., first announced last August. While none of the Tandy machines breaks new industry ground, they are important because of the power of Tandy's retail organization and the popularity of Tandy machines with home and school users.

PC Magazine has already looked at the flagship of Tandy's new line, the powerful 80386-based 4000 ("Heavy Metal: 386s Weigh In," PC Magazine, September 29,

1987), and at the 1400 LT laptop ("On the Road Again: Three New Laptops Join the Race," PC Magazine, October 27, 1987). It's at the lower end of the family that we find the 8088-based 1000 HX and the 80286-based 1000 TX.

**FALLING INTO PLACE** Sometimes it's important to see how products within a line fall into place to understand what the marketer had in mind when he specified a certain design. Such is the case with the new Tandy computers.

## ■ TANDY 1000 SERIES

In the Tandy world, the 4000 series machines are on the top shelf. Designed for multiuser business applications, the 4000 can run DOS application programs and is ready to handle Xenix or OS/2 software when it arrives.

On the next shelf down are the Tandy 3000 series computers. These machines are based on the 80286 microprocessor running at 12 MHz in the case of the Tandy 3000, and at 8 MHz in the case of the model 3000 HL. Both these machines feature 16-bit data paths. The model 3000 can handle up to 16MB of memory under Xenix and can also operate under DOS or OS/2. The 3000 HL can use only DOS or OS/2. The system can accommodate a grand total of 4MB RAM.

Tandy's bottom shelf holds five machines: the 1000 TX and 1000 HX (the subjects of this review), the year-old 1000 SX and 1000 EX, and the 1400 LT laptop. The SX and EX are both 8-bit architecture machines based on the Intel 8088 chip, and the SX is compatible with the original PC. The 256K 1000 EX, priced at \$599, is a PC compatible in an integrated (system unit/keyboard) Apple-like package.

Finally, we come to the Tandy 1000 HX and the 1000 TX. The 1000 HX (like the EX) is a PC compatible in an integrated, Apple II-style chassis. It's based on the Intel 8088-2 microprocessor. The 1000 TX is designed for the sophisticated home user or small-business operator. With its 80286 microprocessor and 8-bit data paths, it's one of dozens of AT compatibles on the market today.

### TANDY CORP.

#### Tandy 1000 HX

The Tandy 1000 HX, priced at \$699, is designed for home and school. It features Tandy's "Power and Run" concept, which means that DOS 2.11 is stored in ROM and that the machine boots up with a DOS A> prompt without reading the operating system files from a floppy disk.

Standard configuration for the 1000 HX includes 256K RAM expandable to 640K, 128K ROM, and 32 bytes of EEPROM (electrically erasable programmable read-only memory), the latter functioning more or less as a resident "CONFIG.SYS" for the resident DOS.



*One advantage of the Tandy 1000 HX is that DOS 2.11 is stored in ROM with the machine booting up directly to the A> prompt, eliminating the need to read the operating system files from a floppy disk. The monitor, however, is no bargain at \$399.95.*

Also standard in the integrated system unit/keyboard is a single 720K, 3½-inch microfloppy disk drive. The motherboard contains video driver circuitry for composite and RGB monitors (CGA compatible), one parallel port, two joystick ports, and an ¼-inch headset jack with volume control, all as standard equipment. Both the headset and a built-in speaker are coupled to the computer's three-voice sound circuit for music generation.

Options include a second 3½-inch disk drive for \$169.95, an external 5¼-inch floppy disk drive at \$249.95, an RS-232 serial port and modem, and any three PLUS-style expansion boards when used

with the proprietary Memory PLUS expansion adapter.

No monitor is included in the \$699 price; in fact, Tandy never sells complete systems, allowing its customers to select exactly the type of configuration they want. Both machines in this review were tested with one of Tandy's two available RGB monitor models. It was satisfactory, but at \$399.95 it was no bargain, and you should be able to find a better display at a better price by shopping à la carte.

**POWER AND RUN** Tandy believes the "Power and Run" concept will be especially successful for school applications.



## Tandy 1000 Series: Summary of Features

(Products listed in ascending price order)

|                                  | Tandy 1000 EX                    | Tandy 1000 HX                               | Tandy 1000 SX              | Tandy 1000 TX                            | IBM PS/2 Model 25                                                 |
|----------------------------------|----------------------------------|---------------------------------------------|----------------------------|------------------------------------------|-------------------------------------------------------------------|
| Base price                       | \$599                            | \$699                                       | \$849                      | \$1,199                                  | \$1,350                                                           |
| <b>BASE PRICE INCLUDES</b>       |                                  |                                             |                            |                                          |                                                                   |
| RAM                              | 256K                             | 256K                                        | 384K                       | 640K                                     | 512K                                                              |
| Floppy disk drives               | 1 5¼-inch                        | 1 3½-inch                                   | 1 5¼-inch                  | 1 3½-inch                                | 1 3½-inch                                                         |
| Monitor                          | None                             | None                                        | None                       | None                                     | 12-inch monochrome                                                |
| Ports                            | Parallel, audio, game            | Parallel, audio, game                       | Parallel, audio, game      | Parallel, serial, audio, game            | Parallel, serial, audio, mouse                                    |
| Slots                            | 3 PLUS-style                     | 3 PLUS-style                                | 5 XT-size                  | 5 XT-size                                | 1 full-length                                                     |
| Keyboard style                   | Proprietary                      | Proprietary                                 | Proprietary                | Proprietary                              | 84-Key Space Saver                                                |
| Clock/calendar                   |                                  |                                             |                            |                                          |                                                                   |
| Software                         | DOS, GW-BASIC, Personal DeskMate | DOS (in ROM), GW-BASIC, Personal DeskMate 2 | DOS, GW-BASIC, DeskMate II | DOS, GW-BASIC, Personal DeskMate 2       | None                                                              |
| <b>FULL CONFIGURATION</b>        |                                  |                                             |                            |                                          |                                                                   |
| Price of fully configured system | \$998.95                         | \$1,098.95                                  | \$1,248.95                 | \$2,397.95                               | \$2,228.00                                                        |
| Full configuration includes      | 13-inch RGB monitor              | 13-inch RGB monitor                         | 13-inch RGB monitor        | 13-inch RGB monitor, 20MB hard disk card | Color monitor, 640K RAM, second floppy disk drive, Collegiate kit |
| <b>SPECIFICATIONS</b>            |                                  |                                             |                            |                                          |                                                                   |
| Microprocessor                   | 8088-2                           | 8088-2                                      | 8088-2                     | 80286                                    | 8086                                                              |
| Clock speed (MHz)                | 4.77/716                         | 4.77/716                                    | 4.77/76                    | 4.8                                      | 8                                                                 |
| Controller card handles          | Two floppy disk drives           | Two floppy disk drives                      | Two floppy disk drives     | Two floppy disk drives                   | Two floppy disk drives                                            |
| <b>OTHER</b>                     |                                  |                                             |                            |                                          |                                                                   |
| Warranty                         | 90 days                          | 90 days                                     | 90 days                    | 90 days                                  | 1 year                                                            |
| BIOS manufacturer                | Phoenix                          | Phoenix                                     | Phoenix                    | Phoenix                                  | IBM                                                               |

● — Yes    ○ — No

## ■ TANDY 1000 SERIES

The Fort Worth marketers also believe that less-sophisticated home users will enjoy its simplicity.

"Power and Run" refers to the resident DOS and the EEPROM which provides the 1000 HX with "instant on" operation. The EEPROM stores the system configuration and user-specified start-up mode. Some 20 system configuration selections are available from the EEPROM menu. One of the EEPROM's other tasks is to tell the system whether to load an application program after the boot process.

"Students in a classroom," says the Tandy literature, "can insert their software diskette, turn the computer on, and begin their lesson with no intermediate steps." Users of the 1000 HX may also specify a simple menu that works like a poor man's DOS shell, or they may boot directly into Tandy's *Personal DeskMate 2* software, which, along with DOS and GW-BASIC, is bundled with both the HX and TX computers.

The ROM-based DOS does seem to be a good idea for the classroom set. It eliminates the requirements for system disks and all the hassles they represent, and it keeps the potentially intimidating prompt out of sight. Home users, however, will get only limited benefit from the on-board

DOS. In fact, most will probably elect to bypass auto-DOS altogether and boot directly from a system disk in the conventional manner.

**HX DRAWBACKS** The bad news about the 1000 HX begins with its integrated keyboard. It's the worst I've ever used. The left side of the 90-key keyboard is reminiscent of the IBM Selectric typewriter, but that's OK. This section is topped with a row containing three groups of four function keys, and that's OK too.

But the right side of the 1000 HX keyboard is truly nightmarish for anyone used to IBM standards or any other logical standard, and that's not OK. Immediately to the right of the typewriter keys are two columns of keys, including Alt, Hold, PrtSc, NumLock, Home, and Cursor Right. The number pad is to the right of this group.

Basically, the Alt key is just about where the Esc key can be found on most IBM-standard keyboards. Think of what this does to the keying of such popular programs as *WordPerfect* and the various keyboard enhancers that use Alt with Ctrl and the function keys.

The IBM gray Minus and Plus keys are gone altogether, although they can be made up through some other keystroke combination. This situation, along with the flipped positions of the Ins and Del keys, can make things exciting for *Frame-work* users by turning a long series of one-hand keystroke combinations into a two-hand, three-finger exercise.

Even if we buy the argument that "good" in a keyboard is simply what one is used to, there still is no excuse for the feel of the 1000 HX keyboard. Marshall-like is the best way to describe it. Not only was the touch unpleasant, but its softness proved to be a constant nuisance. I guess I'm a finger-dragging touch typist, because whenever I'd get distracted and lean back to think for a moment, dozens of strange characters would appear on the HX screen. It turns out that the lightest of residual pressures on an HX key can cause it to fire away. A medium-size cricket could write his autobiography by hopping from key to key on the keyboard of this machine.

Another HX characteristic I didn't like was a continuous high-pitched whine ema-

nating from its innards—perhaps from the power supply. In any event, the little HX that I tested made more noise than my IBM PC AT with its 20MB hard disk or the two-drive Toshiba T1100 Plus laptop machine that sits nearby.

Although the integrated system unit/keyboard looks like an Apple, its construction is not as sturdy. An optional \$29 monitor platform (or some similar piece of

■ Even if we buy the argument that "good" in a keyboard is simply what one is used to, there still is no excuse for the feel of the 1000 HX keyboard.

furniture) is a must. The 1000 HX's case would very likely be crushed under the weight of most RGB monitors.

**TAKING IT SLOW** Finally, there's a "gotcha" in the standard 256K RAM. It's true that the 1000 HX has 256K RAM. However, up to 128K is used by the video logic depending on video mode. This is similar, I was told by Tandy technicians, to the way the original IBM PCjr used RAM for priority housekeeping.

What this means, among other things, is that some of the *PC Magazine* benchmarks run slower on the 1000 HX than they do on the original IBM PC, despite the higher clock speed on the Tandy machine. It also means that a software package that really requires 256K may not run correctly on the 1000 HX with the factory standard 256K RAM.

When all is said and done, I have mixed feelings about the 1000 HX. For some school applications, especially in the lower grades where things must be kept as simple as possible, this machine, with "instant on" and ROM DOS, may be just the thing. Certainly the price is in the right order of magnitude for school operations.

But I also suspect that all but the least



### FACT FILE

#### Tandy 1000 HX

Tandy Corp.  
1700 One Tandy Center  
Fort Worth, TX 76102  
(817) 390-2197

**List Price:** With 256K RAM, one 3½-inch 720K microfloppy disk drive, DOS 2.11 in ROM, *Personal DeskMate 2* software, \$699; 12-inch monochrome monitor, \$129.95; 13-inch RGB monitor (320 by 200 graphics), \$299.95; 13-inch RGB monitor (640 by 200 graphics), \$399.95; second microfloppy disk drive, \$169.95; external 5¼-inch floppy disk drive, \$249.95; 128K RAM expansion board, \$129.95; Memory PLUS expansion adapter, \$129.95; free-standing monitor platform, \$29.

**In Short:** The Tandy 1000 HX offers economical computing for the first-time user, but it is underpowered and very slow. It has little growth potential.

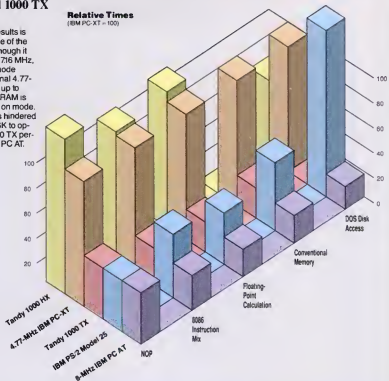
CIRCLE #79 ON READER SERVICE CARD



## Benchmark Tests: Tandy 1000 HX and 1000 TX

The real surprise of these test results is the amazingly slow performance of the 8088-2-based Tandy 1000 HX. Although it has a dual clock speed of 4.77 and 716 MHz, its processor performance in fast mode doesn't even match that of the original 4.77-MHz IBM PC-XT. The explanation: up to half of the system's standard 256K RAM is used by the video logic, depending on mode. Therefore, program performance is hindered and programs that truly require 256K to operate may run into trouble. The 1000 TX performs on a par with the 8-MHz IBM PC AT.

**Relative Times**  
(IBM PC-XT = 100)



### Performance Times

(Times given in seconds except where noted)

|                                             | NOP   | 8086 Instruction Mix | Floating-Point Calculation | Conventional Memory | DOS Disk Access (milliseconds) |
|---------------------------------------------|-------|----------------------|----------------------------|---------------------|--------------------------------|
| Tandy 1000 HX                               | 12.48 | 32.93                | 172.22                     | N/A*                | 151.82                         |
| 4.77-MHz IBM PC-XT (360K floppy disk drive) | 10.10 | 32.00                | 159.20                     | 5.90                | 242.30                         |
| Tandy 1000 TX                               | 4.19  | 9.74                 | 38.39                      | 1.40                | N/A†                           |
| IBM PS/2 Model 25                           | 4.18  | 16.26                | 65.91                      | 3.19                | 322.20                         |
| 8-MHz IBM PC AT                             | 4.17  | 8.96                 | 35.60                      | 1.32                | 42.54                          |

\*N/A—Not applicable: insufficient memory to conduct test. †N/A—Not applicable: nonstandard BIOS-handling procedure does not allow test to be conducted successfully.

The **NOP** benchmark test is designed to measure raw clock speed and memory access time while minimizing differences in microprocessors and the effect of memory caching. This test executes almost nothing but NOP ("No Operation") machine code instructions in a big 128K loop.

The **8086 Instruction Mix** benchmark test measures the time it takes to execute a selected series of processor-intensive tasks. The test program uses 8086 instruction code. These instructions are a subset of the total processor instruction set.

The **Floating-Point Calculation** benchmark test measures processor speed by looping through a series of floating-point calculations, including multiplication, division, exponentiation, and logarithmic and trigonometric functions. The benchmark program uses the floating-point library included with Microsoft C Compiler 4.0.

The **Conventional Memory** benchmark test allocates 256K of conventional memory and treats it as a series of 64-byte records. Then, 16,384 random records are read into and written from this memory. The result shown is the average of the read and write times.

The **DOS Disk Access** benchmark test measures the time it takes to do a random sector read using DOS. DOS buffers are set at 3 and the interleave factor is left at the drive's default setting. This test adds DOS's overhead to the BIOS and hardware times. The test program performs the sector read 1,000 times within the DOS disk partition. The average result is shown in milliseconds.

## ■ TANDY 1000 SERIES

computer-literate of home computerists will soon hit the limits of the 1000 HX and might become unhappy with their investment.

### TANDY CORP.

#### Tandy 1000 TX

When Tandy announced the Tandy 1000 TX in August 1987, it dubbed the TX "the most affordable 80286-powered PC compatible made in America." It was an undisguised challenge to a corner of the market that the basement cloners thought they had to themselves.

With a list price of \$1,199, the 1000 TX may indeed be one of the least expensive U.S.-engineered 286 machines. And with the legitimacy of the Tandy name, the availability of support at 7,000 Radio Shack locations, and the made-in-U.S.A. tag, this machine just might give the imported clones a run for their money.

Since price is an issue (if not the issue) here, let's look at what \$1,199 buys. Standard configuration of the 1000 TX includes 640K RAM and one 3½-inch, 720K floppy disk drive packaged in a system unit of customary appearance that also has room for five PC-compatible expansion cards (10-inch maximum length). The price does not include a monitor.

**CROWDED MOTHERBOARD** The motherboard sports the Intel 80286 microprocessor and has a socket for a math coprocessor. It also includes a parallel port, a serial port, two joystick ports, composite and RGB video, and an ⅛-inch headset jack with volume control. Video is CGA compatible with some Tandy enhancements.

Most users will want additional drives. The system unit can handle a second 3½-inch or 5¼-inch floppy disk drive and a hard disk card (a 20MB model is available from Tandy for \$799). Obviously, the expansion slots let you configure this machine for just about any operation, including as a smart terminal in a local area network.

The keyboard is separate, but it has the same painful layout as the 1000 HX. Much to the credit of the engineers who worked on this keyboard, its touch is less marshmallow-like than that of the HX. That's



*The small-footprint Tandy 1000 TX has room for five XT-compatible expansion cards of up to 10 inches in length. Standard equipment includes a 720K 3½-inch microfloppy disk drive. Mass storage can be achieved with a 20MB hard disk card; Tandy's model sells for \$799.*

not to say that the TX keyboard is good in the highly subjective world of keyboard evaluation. A good keyboard, in my opinion, has recognizable tactile and aural feedback. The TX keyboard has little of either.

Certainly, Tandy is correct in its claim about computing power for the buck with this U.S.-made and supported machine.

Whether one likes the keyboard or not, there's still a lot of basic computing power here. When you add the bundled software, the 1000 TX is a real bargain.

**DESKMATE SOFTWARE** As is the case with the HX, Tandy bundles the TX with MS-DOS (Version 3.2 in the case of the TX), GW-BASIC, and its proprietary



## FACT FILE

### Tandy 1000 TX

Tandy Corp.  
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Fort Worth, TX 76102  
(817) 390-2197


**List Price:** With 640K RAM, one 3½-inch 720K microfloppy disk drive, DOS 3.2, *Personal DeskMate 2* software, \$1,199; 12-inch monochrome monitor, \$129.95; 13-inch RGB monitor (320 by 200 graphics), \$299.95; 13-inch RGB monitor (640 by 200 graphics), \$399.95; second microfloppy disk drive, \$169.95; external 5¼-inch floppy disk drive, \$249.95; 20MB hard disk card, \$799.  
**In Short:** One of the least expensive U.S.-built AT compatibles, the 1000 TX is a straightforward 8-MHz machine that should be considered by bargain hunters.

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integrated *Personal DeskMate 2* software. *DeskMate 2* uses *Windows* conventions, featuring pull-down menus and pop-up dialog boxes. Menus and boxes can be accessed with a joystick, mouse, or keyboard interface.

The *DeskMate 2* software package contains basic word processing, spreadsheet analysis, data file maintenance, and terminal communications. Other *DeskMate 2* functions include phone directory, calculator, notepad, and a 16-color paint application. *DeskMate* also has a music-generation program that can take advantage of the three-voice music circuits built into the HX and TX.

The 1000 TX certainly offers the home user more power and options than the HX, but at a higher price. Nevertheless, the TX may make more sense economically for the sophisticated home user in the long run. Only the least sophisticated home user will stay satisfied with the HX, but the TX has enough backbone to grow into any home-based application (and most office-based applications) as needed.

Both these machines offer economical computing within their respective markets, and both are worth a look if you find that their drawbacks are outweighed by their bargain price tags. 

Richard Aarons is a contributing editor of PC Magazine.

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# REMOTE COMPUTING:

## *The Next Best Thing to Being There*

*Perfect for collaborations, conferences, or calling in to your PC from a distant location, these eight packages let you see and control the action of another computer screen from a remote location.*

Some frustrations are so commonplace you've probably never stopped to think that there might be a better way. If you work outside of the office, for instance, there inevitably comes a time when you wish you could run your office computer from wherever you happen to be. As another example, consider the confusion when you're collaborating with someone by telephone—or, even better, trying to teach a novice computer user a new program by phone. The conversation will probably go something like this:

"Type a slash to bring up the menu."

Silence. "It didn't work."

"Did you type a slash or a backslash?"

"What's a backslash?"

It was for situations like this that remote operations software was created. These programs let two users link up their systems and see the same screens and keystrokes at the same time. Many packages will also give you access to your office computer from a remote location. With the right remote operations program, you can end some of the little confusions and inconveniences of the computing life.

**TWO KINDS** When we first looked at this class of products ("Computing at a Distance," *PC Magazine*, March 31, 1987), we found four programs to review. That number has grown to eight, broken down into two subcategories.

## ■ REMOTE-COMPUTING PROGRAMS



### Remote-Computing Programs:

#### Summary of Features

(Products listed in ascending price order)

|                                                        | PC Anywhere<br>\$99.00                                                                                      | Remote<br>\$195.00                                            | Line Plus<br>Master<br>\$199.95     | Co/See/See<br>\$249.00             | Carbon Copy<br>Plus<br>\$300.00                                     | Close-Up<br>\$440.00                |
|--------------------------------------------------------|-------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------|-------------------------------------|------------------------------------|---------------------------------------------------------------------|-------------------------------------|
| <b>Design</b>                                          |                                                                                                             |                                                               |                                     |                                    |                                                                     |                                     |
| Screen exchange                                        | ●                                                                                                           | ●                                                             | ●                                   | ●                                  | ●                                                                   | ●                                   |
| Keystroke exchange                                     | ○                                                                                                           | ○                                                             | ○                                   | ○                                  | ○                                                                   | ○                                   |
| Memory-resident on host side                           | Optional                                                                                                    |                                                               |                                     |                                    |                                                                     |                                     |
| <b>Talk to:</b>                                        | PC Anywhere<br>ATEM terminal<br>module or any other<br>terminal program<br>such as Crosstalk<br>or Smartcom | Most terminal<br>programs such as<br>Crosstalk or<br>Smartcom | Line Plus Master<br>terminal module | Co/See/See<br>terminal module      | Carbon Copy Plus<br>terminal module                                 | Close-Up Support<br>terminal module |
| <b>File transfer protocol</b>                          | Proprietary<br>(ASCOM IV)                                                                                   | Proprietary (Cros-<br>stalk), Xmodem                          | Proprietary                         | Proprietary                        | Proprietary                                                         | Proprietary                         |
| <b>DIALING FEATURES</b>                                |                                                                                                             |                                                               |                                     |                                    |                                                                     |                                     |
| Terminal can call host                                 | ●                                                                                                           | ●                                                             | ●                                   | ●                                  | ●                                                                   | ●                                   |
| Host can call terminal                                 | ○                                                                                                           | ○                                                             | ○                                   | ○                                  | ○                                                                   | ○                                   |
| Auto-dial                                              | ● (host, terminal)                                                                                          | N/A                                                           | ● (host, terminal)                  | ● (host, terminal)                 | ● (host, terminal)                                                  | ● (host, terminal)                  |
| Auto-log-on                                            | ○                                                                                                           | N/A                                                           | ● (terminal)                        | ● (host, terminal)                 | ● (host, terminal)                                                  | ○                                   |
| Repeat dialing                                         | ○                                                                                                           | N/A                                                           | ● (host, terminal)                  | ○                                  | ● (host, terminal)                                                  | ○                                   |
| Direct-connect option                                  | ●                                                                                                           | ○                                                             | ●                                   | ○                                  | ●                                                                   | ○                                   |
| Phone book                                             | ○                                                                                                           | N/A                                                           | ● (terminal)                        | ○ (host, terminal)                 | ● (host, terminal)                                                  | ● (terminal)                        |
| Talks directly to modem                                | ● (terminal)                                                                                                | ○                                                             | ● (host, terminal)                  | ○ (host, terminal)                 | ● (host, terminal)                                                  | ● (host, terminal)                  |
| <b>HOST-TERMINAL FEATURES</b>                          |                                                                                                             |                                                               |                                     |                                    |                                                                     |                                     |
| Host is password protected                             | Optional                                                                                                    | ●                                                             | ●                                   | Optional                           | ●                                                                   | Optional                            |
| Host reboots on hangup                                 | Optional                                                                                                    | Optional                                                      | Optional                            | Optional                           | Optional                                                            | Optional                            |
| <b>LOGGING AND SCREEN CAPTURE</b>                      |                                                                                                             |                                                               |                                     |                                    |                                                                     |                                     |
| Host creates log                                       | ○                                                                                                           | ●                                                             | ●                                   | ○                                  | Optional                                                            | ○                                   |
| Terminal creates log                                   | ○                                                                                                           | ○                                                             | ●                                   | Optional                           | Optional                                                            | Optional                            |
| Host captures single screens                           | ○                                                                                                           | ○                                                             | ○                                   | Optional                           | ●                                                                   | ○                                   |
| Host captures a sequence of screens and keystrokes     | ○                                                                                                           | ○                                                             | ○                                   | Optional                           | ○                                                                   | ○                                   |
| Terminal captures single screens                       | ○                                                                                                           | ○                                                             | ○                                   | ●                                  | ●                                                                   | ●                                   |
| Terminal captures a sequence of screens and keystrokes | ○                                                                                                           | ○                                                             | ○                                   | ●                                  | ●                                                                   | ●                                   |
| <b>PRINTING OPTIONS</b>                                |                                                                                                             |                                                               |                                     |                                    |                                                                     |                                     |
| Printing                                               | Host, terminal                                                                                              | Host                                                          | Host, terminal                      | Host, terminal                     | Host, terminal                                                      | Host, terminal                      |
| Spooling                                               | Terminal                                                                                                    | None                                                          | None                                | Terminal                           | Host, terminal                                                      | Terminal                            |
| <b>FILE TRANSFER</b>                                   |                                                                                                             |                                                               |                                     |                                    |                                                                     |                                     |
| Initiates transfers from:                              | Host, terminal                                                                                              | Terminal                                                      | Terminal                            | Host, terminal                     | Terminal                                                            | Terminal                            |
| Data compression in file transfer                      | ○                                                                                                           | ○                                                             | ●                                   | ○                                  | ●                                                                   | ●                                   |
| <b>REAL-TIME FEATURES</b>                              |                                                                                                             |                                                               |                                     |                                    |                                                                     |                                     |
| Graphics support                                       | ●                                                                                                           | ○                                                             | ●                                   | ●                                  | ●                                                                   | ●                                   |
| Chat window                                            | ●                                                                                                           | ○                                                             | ●                                   | ●                                  | ●                                                                   | ●                                   |
| Works with SideKick                                    | ●                                                                                                           | ○                                                             | ●                                   | ●                                  | ●                                                                   | ○                                   |
| Works with SuperKey                                    | ●                                                                                                           | ○                                                             | ○                                   | ●                                  | ●                                                                   | ○                                   |
| <b>COMMUNICATIONS</b>                                  |                                                                                                             |                                                               |                                     |                                    |                                                                     |                                     |
| Offers standard communications features                | ● (for dumb terminal features only)                                                                         | ○                                                             | ●                                   | ●                                  | ●                                                                   | ○                                   |
| Supports 9,600-bps modems                              | Hayes Smartmodem 9600, USR HST, Microcom, Fastlink, Teletel                                                 | All, but not optimized for any                                | All, but not optimized for any      | USR HST, EVI Fastcom, Rascal Vedic | Hayes Smartmodem 9600, USR HST, Microcom AX, UDS, Fastlink, Teletel | All, but not optimized for any      |
| Maximum speed                                          | 19.2 kbps                                                                                                   | 9,600 bps                                                     | 19.2 kbps                           | 19.2 kbps                          | 19.2 kbps                                                           | 9,600 bps                           |
| Can turn off error checking                            | ●                                                                                                           | ○                                                             | ○                                   | ○                                  | ○                                                                   | ○                                   |
| Hardware flow control                                  | Optional                                                                                                    | ○                                                             | Optional                            | ●                                  | ●                                                                   | ○                                   |
| Auto-dial and auto-answer with Hayes Smartmodem 9600   | ●                                                                                                           | ● (auto-answer)                                               | ○                                   | ●                                  | ●                                                                   | ●                                   |

●—Indicates Editor's Choice   ●—Yes   ○—No   N/A—Not applicable: This program is designed only for unattended-host applications. Therefore, these features are not necessary.  
\*Remote has compatibility problems when used with a Hayes modem on an AT.

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Proprietary

Zmodem



● (for voice calls only)



Host (in host-terminal mode)  
None

Host, terminal  
None

Host, terminal  
●

Host, terminal  
●

● (in keystroke mode only)



None

All, but not optimized for any

9,600 bps

38,400 bps



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## ■ REMOTE COMPUTING

Six of the eight programs are designed mainly for unattended remote operation and for long-distance support and collaboration. These programs turn one computer into a host, which runs whatever application program you're using; the other unit becomes a remote terminal. Both host and remote, however, show the same screens and can give orders to the application program. The host-terminal programs are capable of fully unattended operation and can also work for computer conferencing.

■ Programs designed for unattended remote operation turn one computer into a host that runs whatever application program you're using.

The host must send full screens of information to the remote terminal, which slows the process down a bit.

A faster alternative is to use a program that is meant specifically for computer conferencing, in which speed is the most important issue. Packages in this group assume that there will always be a person at each computer: they run the application program on both units, sending only keystrokes back and forth. Because both run the same application using identical data files, they see the same readout and get the same input, keystroke by keystroke. This approach is faster than the host-terminal scheme, since only keystrokes are exchanged, but you pay a price for that speed. For one thing, there's the complication of matching data files and application programs on both sides. And also, the keystroke-by-keystroke packages won't let you use a home-based computer from another location.

Since our last overview of remote operations programs, their reliability has improved significantly. Improved reliability shows most clearly at high transfer speeds, in which all four host-terminal packages

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| MODEM T1200           | 329    |
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## ■ REMOTE-COMPUTING PROGRAMS

tested earlier had performed miserably. Last time around, when the machines were directly connected by cable, three programs introduced errors in transmission; with one, the throughput at 9,600 bits per second was slower than at 4,800 bps. With DCA's high-speed Fastlink modem, the problems of three of the packages actually increased. In the current battery of tests, however, almost all of the programs did well at 9,600 bps. And except for *Remote*, still in the same release as previously reviewed, none had problems on the high-speed modem test using the Hayes V-Series Smartmodem 9600.

One thing that hasn't changed is that 1,200 bps is still far too slow for the host-terminal approach, though it's acceptable for the keystroke-by-keystroke packages. All performance tests were run at 2,400 bps as the minimum speed and at 9,600 bps or faster as the most desirable speed.

**HIGH-SPEED DIFFERENCES** How well a program does with one high-speed modem says nothing about how well it will do with another. When one program reviewed here, *Close-Up*, was tested with the Fastlink modem in *PC Magazine*'s last overview, it was unusable at high speed; in this round of tests with the Hayes V-Series Smartmodem 9600, it worked just fine.

The different results come from differences among modems. Unlike 300-, 1,200-, or 2,400-bps modems, those running at 9,600 bps or faster have no generally accepted standard. Almost all have built-in proprietary error-checking protocols; some also have proprietary data compression features. With a few well-defined exceptions, modems from different manufacturers won't even talk to each other at high speeds.

With the differences in error checking, flow control, and data compression, it's no surprise that one high-speed modem may cause problems for a given program while another does not. The distinctions quickly become apparent even with casual use. For remote operations programs, the key issue is turnaround time—the interval required to switch the direction of the communications link. Slow turnaround time is particularly annoying with the host-terminal packages, since the host computer sends full-screen updates to the terminal rather

than simply echoing the keystrokes.

The popular modem protocols at 2,400 bps and slower are full duplex, meaning that information can travel in both directions at once. If you are echoing your keystrokes from the remote computer, every keystroke goes from your computer to the other computer and is echoed back to you even as you type the next keystroke. By

---

■ The best way to run a conference is to have two lines open: for voice and data. If only one is available, most programs provide a chat window.

---

contrast, all high-speed modems in the PC market are half-duplex, meaning that only one side can send information at a time. When using remote echo with standard communications programs, some modems let you get several keystrokes ahead of the screen before the direction of communications switches, or turns around, to echo the keystrokes back to you.

For these tests, I chose the Hayes V-Series Smartmodem 9600, largely because of its extremely fast turnaround time (Hayes claims up to 500 times per second). Even with the remote operations programs, the turnaround is so fast that you can't see any difference from using a full-duplex link. The Hayes modem also uses a proprietary data compression scheme that gives the programs an extra boost in throughput. Be aware that the performance tests at 9,600 bps are specific to the Smartmodem 9600; the relative performance among programs may vary with other high-speed modems. Also, be aware as you contemplate this purchase that the Smartmodem 9600 carries a hefty list price of \$1,299—and you'll need one on each side of the link.

**PLUS ÇA CHANGE** Another thing that hasn't changed is that the best way to run a conference, collaboration, or support ses-

sion is to have two phone lines open, one for voice and one for data. If only one phone line is available, almost all of these programs provide a chat window for typing messages back and forth, which is better than nothing—but not by much. One program, *Co-Compute*, seriously attempts to minimize the difficulties of having only one phone line; even with this program, however, a second line is preferable. If you plan to get a remote operations program, order that second line now.

The remote operations capability is not new; you'll find it in some general-purpose communications programs, including *AS-COM*, *Crosstalk XVI*, and *ProComm*. But aside from being one of the least-used features of these programs, it is also extremely limited.

The remote operations of general-purpose communications programs allow a remote caller to run DOS commands and some application programs on the host system. But in practice, the caller is limited to well-behaved programs, meaning those that go through DOS for screen output. For such well-behaved software, the communications program can read the data going to the screen and can redirect it out the comm port so that the remote caller can see what the user on the host system is doing.

The problem is that many programs (*WordStar* and *Lotus 1-2-3*, among others) are not well behaved. While these programs run on the host system, they don't send their screen output through DOS. As a result, the communications program doesn't see the screen output and doesn't redirect it to the comm port. Therefore, such an application is effectively hidden from the caller.

The remote operations programs reviewed here get around that problem by redirecting the screen output from such programs to the comm port. You'll find the reviews of these eight products arranged in alphabetical order by product name.

## Carbon Copy Plus

*Carbon Copy* was one of the first remote operations programs available. Version 4.0, renamed *Carbon Copy Plus*, is still one of the best.

Though it functions well for computer collaborations and as an unattended host,

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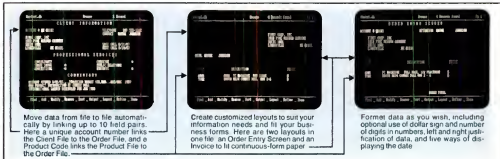
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## ■ REMOTE-COMPUTING PROGRAMS

Meridian Technology's *Carbon Copy Plus* is designed primarily for long-distance support. To set up a support system, the user at the host computer loads the program, which sits in memory until needed.

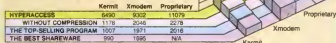
If the user runs into trouble, he can bring up *Carbon Copy Plus* without leaving the application program. *Carbon Copy Plus* will then dial the support number—the remote side of the system. The remote termi-

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## FACT FILE

**Carbon Copy PLUS**

*Carbon Copy Plus*,  
Version 4.0  
Meridian  
Technology Inc  
1101 Dove St., #120  
Newport Beach, CA  
92660  
(714) 476-2224

List Price: \$195 per program (two programs required).

Requires: 256K RAM, one disk drive, DOS 2.0 or later.

In Short: Designed for support applications, *Carbon Copy Plus* is equally appropriate for long-distance collaborations and unattended-host operations. The program's strength is speed of screen updates, particularly for CGA graphics. Not copy protected, but checks serial number.

CIRCLE 811 ON READER SERVICE CARD

nal can call the host at any time. The remote module is not memory resident, however; it runs as a standalone program and must be loaded before use.

**SPOOLS AND MOVIES** Since the remote side is viewed as the support end of the duo, it generally has more options than the host side. Either side can terminate the data link or jump into or out of the application program. But while both sides can direct printer output to either or both computer systems, the remote terminal can also spool the printer information to a file rather than send it to the printer. In addition, either side can capture a screen image to a file for later viewing; the remote side, however, can capture a "movie" that shows every keystroke in all or part of a session. And only the remote side can initiate a file transfer.

*Carbon Copy Plus* has retained all the good points of its earlier versions—particularly where speed is concerned. In tests at both 2,400 and 9,600 bits per second, the program was consistently bested only by *PC Anywhere*, and never by much. Also, *Carbon Copy Plus* had the best performance for file transfer, thanks to its data compression capabilities. The program's real advantage over most of the competition, however, is that when it scrolls up or down one line, it doesn't resend the whole



screen from host to remote. Instead, it sends a single line along with a command to scroll the rest of the screen at the remote side.

At 2,400 bps, *Carbon Copy Plus* feels a little sluggish for word processing or spreadsheets, but it's still better than most contenders. By slowing my typing slightly, I could keep from getting too far ahead of the cursor and could use *WordStar* or *Lotus 1-2-3* without problems. At 9,600 bps and 19.2 kilobits per second, screen updates are impressively fast. Still, whether connected directly or through the Smartmodem 9600, it's easy to get three to five characters ahead of the screen and have the changes suddenly pop up all at once. This is distracting but tolerable.

*Carbon Copy Plus* is the clear choice if you're using CGA graphics; it's really the only program that makes graphics tolerable at 2,400 bps. The program's full graphics mode offers one of the quickest screen transfer times of all the programs tested—and its fast graphics mode, which shows less detail, is nearly twice as swift. In its fast graphics mode at 2,400 bps, *Carbon Copy Plus* transferred a *Harvard Graphics* pie chart from screen to screen in only 12.5 seconds.

**FIXING THE BUGS** Besides keeping this program's good points, Meridian Technology has corrected most of the shortcomings of earlier versions. The program now rarely introduces errors at high speeds, and according to Meridian, the problem that it once had with the Fastlink modem has been fixed. Less important but still noteworthy are some cosmetic changes that make the program easier to learn: the host side is now called the host rather than the remote; the remote terminal is now called either the remote side or the support side. The manual, substantially rewritten, includes these changes.

Another nice alteration to the program concerns a warning message that should be ignored under some conditions: now the manual explains when to ignore it. Finally, the remote side of Version 4.0 has a terminal emulator as well (the "Plus" in the program's name). It's roughly equivalent to *PC-Talk4* with a script language added. If you don't already have a standard communications program, this terminal emula-

tor may save you from having to buy one.

The few problems I ran into with *Carbon Copy Plus* were easily corrected. For example, using an AT as the host and a PC as the remote caused problems with file

transfer; these disappeared when I reinstalled the AT side for a Compaq Deskpro 286. The only inconvenience that remains in the program is that if you load the host module and then change default settings

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## ■ REMOTE-COMPUTING PROGRAMS

with the installation module, the host program won't know about the changes until you reboot your system.

With its brisk speed, *Carbon Copy* has always been one of the better choices for long-distance collaboration. *Carbon Copy Plus*, easier to use than its predecessors, is looking better as a support tool, too. It's definitely worth a look.

### Close-Up

Only recently revised, *Close-Up's* long life in its original version says something about Norton-Lambert Corp.'s beta testing; that it's still a competitive package even in Version 1.10, which we tested for this article, says something equally praiseworthy about the quality of the original.

**EASY TO USE** *Close-Up* was developed as a support package—so much so that the host program is called Customer



### FACT FILE

Norton-Lambert  
*Close-Up*

**Close-Up, Version 1.10**  
Norton-Lambert Corp.  
P.O. Box 4085  
Santa Barbara, CA  
93140  
(805) 964-6767  
**List Price:** \$195 for Customer program; \$245 for

Support program.

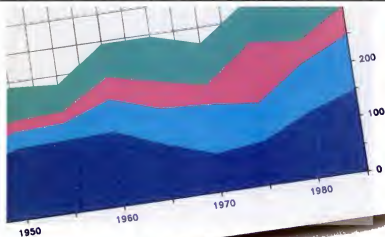
**Requires:** 36K RAM for Customer program without graphics, 48K RAM with graphics; one floppy disk drive; DOS 2.0 or later.

**In Short:** *Close-Up* can be used for computer collaborations or unattended-host operations, but it is tailored for support operations, and has a full range of support features. The program's real strength is ease of use for the host side; its weakness is its slow screen scrolling. Not copy protected.

**CIRCLE 610 ON READER SERVICE CARD**

and the remote module is called Support. Not surprisingly, the program's strength is its ease of use: carefully designed menus pose minimal difficulties for the unsophisticated user, and the manuals are hardly needed. As with *Carbon Copy Plus*, the Customer (host) module loads on one computer and sits in memory, while the Support (remote) terminal is a standalone program. If a user on the customer side needs help, he can bring up *Close-Up* with a hotkey and let it dial the remote number; the remote terminal side, too, can call the host at any time.

As with *Carbon Copy Plus*, the remote terminal has more options than the host side, including spooling printer information to a file, initiating a file transfer, and capturing a screen image or a "movie" of a session. Either side can terminate the data link or jump into or out of the application program. Unlike *Carbon Copy Plus*, however, only *Close-Up's* remote module



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has a phone book, the rationale being that one terminal may need to support several customers but that a given customer will need to call only one support number.

**MIDDLING PERFORMER** *Close-Up* finished in the middle of the pack in our performance tests. The program's fast graphics option updates the screen only slightly more quickly than does *Carbon Copy Plus*'s full graphics approach. At 2,400 bits per second, *WordStar* and *Lotus 1-2-3*, though tolerable, are sluggish. The biggest obstacle with these applications is that *Close-Up* resends the entire screen every time you scroll up or down a line; you'll quickly lose patience with this approach to scrolling when moving through a spreadsheet one line at a time. At 9,600 bps, with the computers connected directly, performance is disappointing, with occasional long gaps between typing and response. Surprisingly, 9,600-bps

performance is better through the Smart-modem 9600. But don't run out and buy that modem just for *Close-Up* 1.10—the improvements simply aren't dramatic enough to warrant that purchase.

Building on the version reviewed here, *Close-Up* 3.00 includes a standard terminal emulation in the Customer side and an automated communications system feature on the Support side. The terminal can operate in the background so that you can transfer files while using your computer for something else. The automated communications system in the Support side permits unattended operations, so users can transfer files automatically without needing anyone at the keyboard. According to Norton-Lambert, the remote capabilities have also been enhanced.

The new version of the Customer side uses somewhat more memory than the older version—45K to 66K rather than the 36K to 48K of the older version. Because

of the difference in memory requirements, Norton-Lambert plans to continue selling the old version as well as the new. The price of Version 3.00 is the same as that of Version 1.10.

Even against newcomers, *Close-Up* 1.10 holds its own. If you're looking for a remote operations program for support and your primary concern is ease of use, this package remains a good choice.

## Co-Compute

If even the fastest of the host-terminal packages is too slow for you but the idea of coordinating applications programs and data files seems too cumbersome, *Co-Compute*, from Harmony Technology Associates, lets you have it both ways. Designed as a conferencing program, the original version of *Co-Compute* offered only the ability to exchange keystrokes. Version 2.0, however, has added a host-

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## ■ REMOTE-COMPUTING PROGRAMS

terminal mode, so you can run programs without needing identical files on both sides of the link.

**ONE PHONE LINE.** *Co-Compute* assumes that there will always be a knowledgeable user at both computer keyboards; it makes no provision for unattended-host operation and has few features aimed at supporting unsophisticated users. While *Co-Compute* can be used for support, its real strength is for long-distance collaborations and presentations.

The *Co-Compute* design also assumes that most users will have only one phone line. Since you have to coordinate the computers on both sides of the link, the program requires that all conferences begin with a voice conversation. Typically, you make a phone call, use the setup module to load the program on each computer, then put the application disk and data disk into each system or change to the appropriate subdirectories. If necessary, you also use the file transfer feature in the setup program to send files.

*Co-Compute's* approach to file transfer is unusual. Instead of connecting the computers first and letting one or both sides give the command to transfer the files, *Co-Compute* lets you set up the file transfer

while you are still talking. One side chooses Send from the menu and enters the filename; the other side chooses Receive and also enters the filename. When both users are ready, each picks Go from his menu. The computers give the appropriate commands to the modems, establish a connection, flash a message to hang up the phone, and transfer the file. When file transfer is finished, the program puts a message on-screen at each side to pick up the phone and press the Esc key. Once both users have done so, *Co-Compute* tells the modem to hang up the phone.

These preliminaries set up both sides so that they are coordinated from the moment the computers establish communications. When both users are ready, each calls up the memory-resident portion of the program. One side picks Transmit, the other side picks Receive, and the computers again tell the modems to establish communications.

To prevent the confusion resulting from both sides trying to type simultaneously, *Co-Compute* lets only one keyboard at a time give commands to an application program. Both keyboards, however, can give commands to *Co-Compute*. Either side can bring up the on-line menu, open the note window, or issue a command to suspend operations. The menu on the receiving side also has a choice that allows the receiving side to take control of the keyboard.

**HOST-TERMINAL OPTION** Another menu choice lets either side become a remote terminal to the other computer. This host-terminal mode is intended for those times when only one side has a particular program or data file. The terminal mode, of course, slows down performance, and, as with the other mode, only one keyboard at a time is active for application programs. Another potentially useful feature is a real-time keystroke window that will show you each keystroke as it is typed, including both character keys and nonprintable characters, such as function keys and control keys. Unless you are extremely familiar with the application program, this information can be helpful both in collaborations and in support situations.

In host-terminal mode, *Co-Compute* performed acceptably at 2,400 bits per sec-

ond. Though the scrolling times for *WordStar* were among the slowest measured, *WordStar* was far easier to use than the times suggest because of *Co-Compute's* method of scrolling. Unlike most other programs, *Co-Compute* interrupts the re-write of a scrolling screen in *WordStar*, giving priority to rewriting the line you're currently typing on. Ironically, though the *Lotus 1-2-3* scrolling times were faster, that program was less comfortable to use because it was far too easy to get ahead of the cursor.

At 9,600 bps, with the computers directly connected, *Co-Compute's* host-terminal mode is a delight. *WordStar* took only 2.6 seconds to scroll a full screen at the terminal, and the cursor lag in *Lotus 1-2-3* was barely noticeable. As tested, *Co-Compute* would not work with the Smartmodem 9600 because the program doesn't wait long enough for the Smartmodem to establish a connection. Harmony Technology Associates reports that a remedy for that problem is on the way.

In *Co-Compute's* symmetric mode, of course, speed of screen update is not an issue since the program sends only keystrokes back and forth. What is impressive, however, is that *Co-Compute* doesn't lose those keystrokes. I made an effort to confuse the program in 1-2-3 by running it on different-speed computers and scrolling the cursor far faster than 1-2-3 could keep up with. Even with this battering, *Co-Compute* stayed fully synchronized.

In either mode, *Co-Compute* is a reliable, carefully designed, well-executed package. If your primary application is collaboration between two knowledgeable users or support of relatively sophisticated users, *Co-Compute* is a good pick—particularly if you can't or won't add a second phone line for simultaneous voice and data.

## Co/Session

Programs designed principally for real-time support assume that the user on the terminal side will know more than the user on the host side; they give more control and more menu options to the remote end. That's fine for support situations, but it has drawbacks for long-distance collaborations, in which the ability to initiate file



## FACT FILE



**Co-Compute,  
Version 2.0**  
Harmony Technology  
Associates  
3700 S. Sepulveda  
Bld., #332  
West Los Angeles, CA  
90034

(800) 622-7660  
(213) 429-4103 (in Calif.)  
List Price: \$495 (for twin pack), \$279 (for  
single copy).  
Requires: 256K RAM, one disk drive, DOS  
2.0 or later.  
In Short: Designed for computer conferenc-  
ing, *Co-Compute* is also suited for long-dis-  
tance collaborations and, to a lesser extent,  
for support. It cannot function as an unattend-  
ed host. *Co-Compute* is unique in offering  
both a keystroke exchange mode and a host-  
terminal mode. Not copy protected.

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transfers or to capture screenshots is equally useful to both sides. *CoSession*, from Triton Technologies, tries to remedy that problem by offering a dual approach to remote operations, letting you choose the design you need.

**MULTIPLE PERSONALITY** When you install *CoSession*, the program asks if you want the support version or the application version. The application version is the equivalent of *Close-Up's* Customer side; it can function only as a host and has fewer features than the support side. *CoSession's* support version, too, is similar to that of *Close-Up*, but it can also function as the host side when talking to another copy of *CoSession* support. (Two application versions cannot talk to each other.) Even when functioning as host, the support version includes features such as a log, screen capture, and the ability to initiate a file transfer. The support version also



## FACT FILE



**CoSession,  
Version 2.00**  
Triton Technologies Inc.  
146 Maple Ave.  
Red Bank, NJ 07701  
(201) 741-3232  
List Price: \$249 (two-  
user-license); \$125 (sin-  
gle-user license for application version); \$175  
(single-user license for support version).

**Requires:** 128K RAM, one disk drive, DOS  
2.0 or later.

**In Short:** *CoSession* lets you tailor the pro-  
gram at installation for either support or col-  
laboration. The dual personality is intrigu-  
ing, but in the current release, the program  
suffers from performance problems, includ-  
ing a slow screen-transfer speed for CGA  
graphics. Not copy protected.

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allows terminal emulation for standard communications.

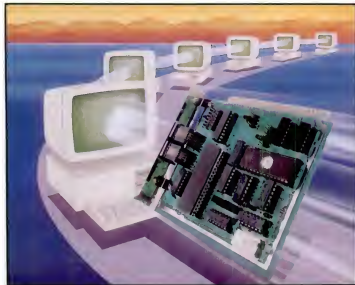
This multiple personality lets *CoSession* tailor itself to your situation. To use it for support, you create one support version and one application version. For long-distance collaboration, you can set up two support versions.

Using *CoSession* is much like using *Close-Up* or *Carbon Copy Plus*, except that both sides are memory resident. If you're running the support version on both computers, the side that makes the call becomes the remote terminal and the side that answers becomes the host. Triton Technologies says that a unit running the application version can also call a support version and establish communications, with the support side becoming the remote terminal. Every time I tried this, however, the support side crashed.

*CoSession* turned in a mixed performance in our tests. It was among the fastest

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## ■ REMOTE-COMPUTING PROGRAMS

programs for scrolling up or down one line in *WordStar* and *Lotus 1-2-3*: like *Carbon Copy Plus*, *CoSession* sends one line of text from the host, along with a command to scroll at the terminal. With *WordStar*, *CoSession* occasionally lost characters during fast bursts of typing, but they were lost from both screens, making this a minor annoyance rather than a serious problem. Triton Technologies couldn't reproduce the loss of characters—and it couldn't help me cure the problem on my computers.

*Lotus 1-2-3* fares well with *CoSession*. At 9,600 bits per second with the Smartmodem 9600, screen updates are rapid. Cursor movement outpaced that of most other programs, and the lag between keystroke and cursor movement was barely perceptible.

**THE BIG RED SWITCH** *CoSession* was the slowest program we tested for graphics screen updates and file transfers. That's because the *CoSession* protocols don't include any data compression; Triton Technologies says this feature will be added in Version 2.10, which was not available for review. Speaking of graphics, though, you'll have to be careful if you're running an EGA at the host and a CGA at the remote terminal with this program. Loading *Microsoft Word* in graphics mode froze both systems badly enough to require the big red switch reset on both sides. This is obviously a drawback if you plan to run your system as an unattended host.

*CoSession* has too many small problems to win unconditional praise, but the key word is *small*. Moreover, each problem is balanced by a useful design feature, such as an unload utility that removes the program from memory without requiring a reboot. The package is certainly no more flawed than, say, early versions of *SideKick*, and its multiple personality is intriguing. Keep an eye on this one.

### In-Synch

*In-Synch*, from American Video Teleconferencing Corp., combines remote operations with graphics presentation features. The result is a program that can function in standalone graphics presentations, long-distance collaborations, and to a lesser de-

**FACT FILE**



**In-Synch, Version 2.00**  
American Video  
Teleconferencing Corp.  
110 Bi-County Blvd.  
Farmingdale, NY 11735  
(516) 420-8080  
**List Price:** \$495 (for  
twin pack); \$295 (for single  
pack).  
**Requires:** 128K RAM, two disk drives (hard  
disk recommended), DOS 2.1 or later.  
**In Short:** *In-Synch* combines remote opera-  
tions features with presentation graphics to  
offer remote-controlled graphics presenta-  
tions. A superb presentation tool, the pro-  
gram can also be used for computer confer-  
ences, collaborations, and to a lesser degree,  
support. There is no host-terminal mode. Not  
copy protected.  
CIRCLE 604 ON READER SERVICE CARD

gree, long-distance support. *In-Synch* really shines, however, when you use the graphics and the remote features together, creating on-line slide shows and presenting them at a remote computer.

**SLIDE SHOWS** The Slides menu in *In-Synch* lets you save an image of the current screen, then recall that image and modify it by changing colors, typing text, drawing boxes, and otherwise highlighting areas of interest. The program also lets you create a slide from scratch by clearing the screen and filling in the background with the color of your choice. Once you've created several slides, you can assemble them in a presentation. You can then present an electronic slide show on your own computer or can go on-line, transmitting the slide files to another computer running *In-Synch* and controlling the presentation at the remote location.

Going on-line with *In-Synch* is similar to going on-line with *Co-Compute*; both programs assume that someone will always be at both keyboards. After loading *In-Synch* on both sides and setting both to the appropriate directories, you bring up *In-Synch* and pick Start Conference from the main menu. *In-Synch* can dial the call on one side and automatically answer on the other, but because the two computers must coordinate programs and data files,

the safest way to start a conference is by voice. Once both computers are set up properly, you can establish the connection by telling one side to place a call and the other side to receive one.

Immediately after establishing communications, *In-Synch* shows the Transfer Data menu on the assumption that the first step in a conference will be to send files. You can choose from Data Files, Presentation, or Slide, and the program prompts you at each step in choosing and sending the files. To give an on-line presentation, you send the appropriate files, select the Presentation menu, and show the slides. If you're using *In-Synch* to collaborate on a written report or spreadsheet, you send the data file, load the program, and work from both keyboards.

**FAST TRANSFERS** Because the two computers exchange keystrokes only, speed of screen updates is irrelevant. File transfer speed is important, however, since you'll almost always begin a session by sending a file. At 2,400 bits per second, *In-Synch* yielded the third-fastest transfer time for a text file and the second-fastest time for a binary file of all the programs reviewed here.

Earlier releases of *In-Synch* had two serious problems. With Version 1.03, you could make your computer crash by loading *In-Synch*, typing a file, and hitting Ctrl-C while the file was printing to screen. Also keystrokes tended to get lost en route, so that the screens and cursor position on the two computers would not match. Both problems have been fixed. Version 1.03 also had an unnecessarily complicated installation procedure that Version 2.00 has greatly simplified.

*In-Synch* is worth considering for collaborations between knowledgeable users, particularly where a second phone line is available for voice communications and where speed is important. Most impressive, however, is this program's handling of on-line presentations. Not only is *In-Synch* the only remote operations software to make graphics presentations an integral part of the program, but it's hard to imagine software that would integrate these features more naturally. For on-line presentations, *In-Synch* is clearly the program of choice.

## Line Plus Master

*Line Plus Master* is the Clark Kent of remote operations programs: it's so easy to use that on first glance it looks wimpy. But behind that mild-mannered interface is a solid array of features. The more you look under the surface, the more you'll find this program can do.

Concept Development Systems sees *Line Plus* as a support tool and has tried to make the program as unobtrusive as possible. The company reasons that anyone giving phone support shouldn't also have to support the support tool. Toward that goal, the *Line Plus* package comes with a useful utility called *Line Expert*, which is basically a combination on-line reference manual and troubleshooting flowchart for solving communications problems between PCs. *Line Expert* asks questions about the problem you want to solve and then offers suggestions for solving it. It grinds out its answers slowly, but if your knowledge of

communications is anything less than perfect, this feature could prove invaluable.

The *Line Plus* package also includes the *Line Plus* host program and the remote terminal program (the host module is available separately, too, so you don't have to buy a complete package for each computer user who needs support). The host program offers an absolute minimum of installation choices: bit-per-second rate, comm port, modem type, and a few other basics. Once these are set, a user need never look at the setup module again.

The host program is memory resident and can be called up at any time. When the host isn't connected to a support computer, *Line Plus* offers the option of returning to your DOS application, freeing the line for another communications program, dialing a phone number, or switching a phone call from voice to data. The remote terminal menu has many more choices than the host side but still gives an impression of sim-

plicity. The main menu offers only six options, and the choices within each menu are divided into easily digestible chunks. If you're at all familiar with communications, you won't need a manual to get this program working.

**SMOOTH OPERATOR** Once you're on-line, you'll find *Line Plus* a breeze to use. The on-line menu has just five choices: return to your DOS application, switch from modem to voice communications, open the chat window, turn off the host keyboard, and log out. In addition, you can run the host setup program from the remote terminal; any changes you make will be written both to disk and to memory on the host side.

Many of the program's features work so smoothly that they almost escape notice. When you add a new entry to the phone book, for example, *Line Plus* asks if you want to call the number immediately.

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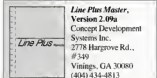
CIRCLE 313 ON READER SERVICE CARD

PC MAGAZINE ■ JANUARY 12, 1988

## ■ REMOTE-COMPUTING PROGRAMS



### FACT FILE



**Line Plus Master,  
Version 2.09a**  
Concept Development  
Systems Inc.  
2778 Hargrove Rd.,  
#349  
Vining, GA 30080  
(404) 434-4813

List Price: \$199.95 for *Line Plus Master* (including *Line Plus Remote*, *Line Plus Local*, and *Line Expert*); \$99.95 for *Line Plus Remote* (including *Line Expert*).

Requires: 90K RAM for *Line Plus Master*; 256K RAM for *Line Plus Local*; 384K RAM for *Line Expert*; one disk drive; DOS 2.0 or later.

In Short: *Line Plus Master* is the most unobtrusive of the remote operations programs—and the easiest to learn and use, particularly on the host side. It lacks the ability to capture screens or sessions but is otherwise suitable for support of unsophisticated users. Not copy protected.

CIRCLE 606 ON READER SERVICE CARD

And although the program has no script or macro language, it will record a log-on procedure for you, automatically learning that procedure by watching your keystrokes. This feature will also record any sequence of commands, though it offers no way to edit out mistakes. As shipped, *Line Plus* has about a dozen prewritten macros that set the program for The Source, MCI Mail, a *Line Plus* host, and other systems.

**MIDDLE OF THE PACK** The only notable weakness of this program is speed. Like *Close-Up*, its major competition for ease of use, *Line Plus* finished in the middle of the pack in our performance tests. It rewrites the entire screen when scrolling line by line in *WordStar* and *Lotus 1-2-3*. *Line Plus* is also a poor choice for graphics programs: its graphics screen transfer was among the slowest we checked.

At 2,400 bps with *Line Plus*, *WordStar* and *Lotus 1-2-3* both worked, if rather slowly. At 9,600 bps with computers directly connected, typing with *WordStar* was almost like working without a remote program, except for the slow scrolling time; *WordStar* was slower with the Smartmodem 9600, but still the speed was

acceptable. *Lotus 1-2-3* put in only a borderline performance at 9,600 bps, with too much lag between keystroke and cursor movement. In all of our *Line Plus* tests, the 9,600-bps screen update was only marginally faster than that at 2,400 bps. Concept Development Systems says that it measures twice the speed at 9,600 bps, but the company couldn't explain why our results should differ.

The only program in our tests that gave *Line Plus* a problem was *SuperKey*, which when called up on the host screen would immediately make the system crash. Another minor complaint is that the program calls the host module *Line Plus Remote* and the remote terminal *Line Plus Local*, a potentially confusing scheme.

If you're primarily interested in support applications and if you firmly believe in the KISS principle of human engineering (Keep It Simple, Stupid), *Line Plus Master* may be your best choice. The only important support feature missing is the ability to capture screens or sessions to disk—and the host side is by far the simplest program for an unsophisticated user to learn.

## PC Anywhere

Given that most remote operations packages cost between \$200 and \$500, you probably wouldn't expect much from a program that costs \$99 and comes with both host and remote software. But you'd be wrong. *PC Anywhere*, from Dynamic Microprocessor Associates of New York, is one of those rare programs that cost less than the competition yet offer better performance.

**SPEED DEMON** *PC Anywhere's* strongest point is speed. In almost every test we put it through, this program turned in the fastest time or close to it. The one exception was for CGA graphics—and even here, *PC Anywhere* was bested only by the fast graphics modes of *Close-Up* and *Carbon Copy Plus*. For full graphics, *PC Anywhere's* 22-second screen transfer time whipped everybody; only *Carbon Copy Plus* came close.

File transfer speed was less impressive, as Version 2.04's lack of data compression left it well behind most other packages.

Data compression will be added to the program in Version 2.10, however. A prerelease copy of Version 2.10 transferred the text file and the binary file, finishing each in under 2 minutes. Among host-terminal combinations, both of these times tie for second place with *Close-Up* and are only a few seconds behind first-place *Carbon Copy*.

*PC Anywhere* also responds quickly to individual keystrokes. At 2,400 bits per second, *WordStar* and *Lotus 1-2-3* are comfortable to use; the lag between keystroke and on-screen display translates into a slight sponginess rather than a clear delay in response. Even typing at top speed with *WordStar*, it's impossible to get ahead of the screen except when it's being rewritten. With the Smartmodem 9600, keystroke response time is better still, approaching the quality of a computer terminal operating at 9,600 bps.

*PC Anywhere* gets much of its speed by cutting corners on error detection. The installation module gives three error-checking choices: slow, fast, and none. The ability to turn off error checking is a valuable feature when you're using high-speed modems with built-in error-checking protocols. According to the manual, fast error-



### EDITOR'S CHOICE FACT FILE



**PC Anywhere,  
Version 2.04**  
Dynamic Microprocessor  
Associates of  
New York  
Distributed by EKD  
Computer Sales &  
Supplies Corp.

764 Middle Country Rd.  
Selden, NY 11784  
(516) 736-0500

List Price: \$99 (including host and remote terminal).

Requires: 128K RAM, one disk drive, DOS 2.0 or later.

In Short: *PC Anywhere* wins the speed sweepstakes for host-terminal combinations. As the least expensive package, it's also the clear front-runner in giving the most bang per buck. Designed for unattended-host operations, *PC Anywhere* can also function for long-distance collaborations or support. Not copy protected.

CIRCLE 607 ON READER SERVICE CARD



checking is appropriate for most conditions, and in my tests it gave essentially the same results as no error checking. Slow error-checking is the most reliable, but it significantly retards screen update.

*PC Anywhere's* design is biased toward unattended-host operations. Notable for their absence are such features as a phone book, auto-log-on, repeat dialing, automatic log creation, and the ability to capture screenshots to disk. On the other

tions nicely for phone support or collaboration. The host module can be set in memory-resident mode; from there you can simply bring it up from within an application and have the program make a call

or let it answer an incoming call. Once on-line, *PC Anywhere* behaves much like other remote operations programs. You can control the host computer from either keyboard, call up a chat window, transfer

■ *PC Anywhere's* strongest point is speed. In almost every test, this program turned in the fastest time or close to it. The one exception was for CGA graphics.

hand, the program gives you some interesting choices: it lets you set your host to answer on a specified ring, for example, and select whether to allow the remote terminal to reboot the host system. You'll also find such features as the ability to talk to about 30 terminal types, including such common choices as the DEC VT-100 and IBM 3101. Since most communications programs emulate one or more of these terminals, you can call into *PC Anywhere* with nearly any computer equipped with communications software.

*PC Anywhere* comes with ATERM, a simple dumb-terminal program. Running ATERM on a PC, you can control the host computer without having to worry about special keys, such as PgUp, that are specific to the IBM PC and compatibles. If you need to call from a non-IBM compatible, however, ATERM lets you emulate these keys with escape codes—interpreting Esc I, for example, as the Ins key.

**FRUITFUL COLLABORATIONS** Despite *PC Anywhere's* emphasis on unattended-host features, the program func-



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## ■ REMOTE-COMPUTING PROGRAMS

files, and direct printer output to either side (or pool it on the remote system).

Ultimately, the few features missing from *PC Anywhere* are more sizzle than steak. None of the tests we tried on it revealed any serious problems, and it was the only package fast enough to make *SideKick* usable at 2,400 bps. If you believe that speed is the key for useful remote operations, *PC Anywhere* is the obvious choice.

### Remote

*Remote*, from DCA/Crosstalk Communications, was the first remote operations program for the PC. When it was the only show in town, this package was a lot like the proverbial dancing bear—the wonder was not how well it performed, but that it performed at all. Unfortunately, that's not enough anymore.

**NOT FOR SUPPORT** *Remote* does not include a separate terminal program for talking with the host. Instead, like *PC Anywhere*, the DCA/Crosstalk Communications package supports unattended operation with a wide range of terminals, including the popular DEC VT-100, IBM 3101, and about 20 others. Most terminal programs can emulate at least one of these, so it's a rare computer that can't call into a

system running *Remote*. (The program can even talk to the diminutive Tandy Model 100.) Although it keeps the host keyboard active, the *Remote* package isn't designed for phone support or long-distance collaboration. It wouldn't be easy to use that way, either; it's the only remote operations program we reviewed that lacks a chat window.

To use *Remote*, you load it as a stand-alone program, choose the proper settings, and otherwise leave it alone. The program will answer the phone, ask for a password, and create a log of incoming calls. Callers can run most text programs, exchange files, or leave messages on the built-in e-mail system.

### DISAPPOINTING PERFORMANCE

*Remote*'s file transfer feature uses the proprietary Crosstalk protocol, so we used *Crosstalk XVI* as the terminal program, setting it for VT-100 emulation as the manual recommends. Even so, *Remote* put in a rather poor performance. At 2,400 bits per second, it turned in the slowest times for all but one screen update; file transfer times were somewhat better, with *Remote* solidly in the middle of the pack. At 9,600 bps with the Smartmodem 9600, *Remote* scrolled more quickly than did *Line Plus Master* or *Close-Up*. Because it lacks its own error-checking protocol for keystrokes and screen updates, there is nothing that might interact with the Smartmodem 9600 error-checking protocol to slow down throughput.

Unfortunately, there's a catch. With the Smartmodem 9600 at 9,600 bps, *Remote* repeatedly failed to transfer a file properly. When given the file transfer command from a terminal running *Crosstalk*, *Remote* started to receive the file well enough; then, in midstream, it lost track and dumped me back to the DOS prompt. But that's not all: the incoming data continued to pump into the DOS command line, resulting in a series of bad commands. The problem may be specific to the Smartmodem 9600, since file transfer runs smoothly at 9,600 bps with two computers directly connected. According to DCA/Crosstalk Communications, the difficulty appears to come from timing problems: it shows up only when an AT or some other fast machine is used.

## PC EDITOR'S CHOICE

### • PC Anywhere

*With four distinct applications for remote-computing programs—support, collaboration, conferencing, and unattended-host applications—the best choice depends on the application for which you plan to use the package. But if there's one program that can handle it all, it's PC Anywhere. Although it lacks some useful features for support and collaboration, PC Anywhere is first in its class for unattended-host operations as well as for rapid-fire updating of screens.*

*For its full range of support features and ease of use, honorable mention goes to Close-Up. For more-sophisticated users, Carbon Copy Plus offers almost the same features as well as greater speed. For long-distance collaboration or presentations, Co-Compute combines performance with flexibility, allowing you to switch between keystroke exchange mode and host-terminal mode.*

*Remote* has a few other serious flaws. One is its lack of graphics support. Another is the way the program handles specialized keys such as PgUp, PgDn, and the function keys. When controlling the *Remote* system from a non-IBM PC, you can emulate these keys with escape codes, as you can with *PC Anywhere*. Alas, you have to use these same escape codes even when the calling computer is an IBM compatible.

By any measure, *Remote* as it stands now simply isn't in the same class as the other programs reviewed here. But if you're not in a rush to buy, don't cross this program off your list completely. Rumor has it that *Remote* is currently being rewritten, and a thoroughly revised version may soon be available.

*M. David Stone is a contributing editor of PC Magazine.*



### FACT FILE



*Remote*, Version 1.3  
DCA/Crosstalk  
Communications  
1000 Holcomb Woods  
Ply., #440  
Roswell, GA 30076  
(404) 998-3998  
List Price: \$195 (host

only).

**Requires:** 192K RAM, one disk drive, DOS 2.0 or later.

**In Short:** The first remote operations program for the PC, *Remote* is showing its age. Designed for unattended-host operations, the program is not well suited to long-distance support or collaborations. The one interesting feature is a built-in e-mail system that is unique among the programs reviewed here. Not copy protected.

CIRCLE 66 ON READER SERVICE CARD

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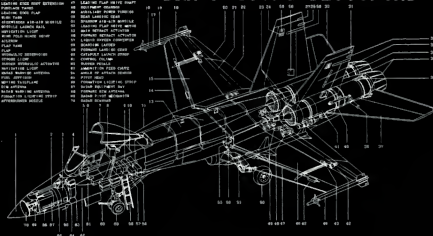
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■ PC LAB NOTES: HELP UTILITY ■ MICHAEL J. MEFFORD

# CUSTOM-DESIGN YOUR OWN HELP SCREENS

*By using HELP.COM and the CAPTURE.COM program in this issue's Utilities column, you can pop up your own help screens, reference tables, or the like anytime you want.*

[The PC Lab Notes and Utilities columns in this issue bring you two coordinated programs. **HELP.COM**, presented here, lets you pop up your own customized help or reference screens in the middle of an application program. **CAPTURE.COM**, in this issue's Utilities column, helps you create and capture suitable screens for **HELP** to pop up. In our next issue we will present a third program, **PAINT.COM**, that lets you edit and spruce up screens you can **CAPTURE** and then pop up with **HELP**.—Ed.]

Unless you're a practiced expert, a program's on-line help facilities often make the difference between an application that's a pleasure to use and one that fights you every step of the way. Only too often a program's built-in help screens are so sparse as to be trivial. Or they're so encyclopedic that you have to go through three menu levels deep to find the information you need. Digging out a reference manual to find the syntax for a command is hardly an exercise in efficiency—even if you can find the manual. The result is that there probably isn't an office that uses a full-featured program in which the local guru hasn't had to prepare a single-sided sheet entitled, "All you ever needed to know about using X."

Wouldn't it be nice to be able to pop that sheet up on the screen anytime you needed it? That's what **HELP.COM** is for. **HELP** is a memory-resident utility that enables you to keep at your fingertips several pages of reminders—of a program's command sequences, of tables of airline

flights, or of anything else you might want to reference—either from the middle of an application or at the DOS prompt.

In normal use you'll probably load **HELP** along with a menu file you create

## PRODUCTIVITY INDEX

### PC LAB NOTES

**HELP** pops up your own help screens while you run other programs.

### UTILITIES

**CAPTURE** snatches helpful screens so **HELP** can pop them up later.

### ENVIRONMENTS

How to do graphics in OS/2's character-mode environment.

### POWER PROGRAMMING

Reeling in environment strings with MASM and C routines.

### SPREADSHEET CLINIC

Laser-printed spreadsheet shading; 1-2-3 bug; relative references.

### USER-TO-USER

Batch files that will run programs overnight any night you ask.

### POWER USER

Big capital letters drop in on *Word*; busting out of *dBASE* limits.

### LANGUAGES

Printer output detours in C; mind-boggling Turbo Pascal encryption.

### PC TUTOR

What the S means to assembly language programmers.

### CONNECTIVITY CLINIC

Connectivity chapel; linking PCs and HP minis; wasting paper.

using **CAPTURE** (see this issue's Utilities column) or **PAINT** (next issue) as a simple line in your **AUTOEXEC.BAT** file, thus:

### HELP filespec

where *filespec* is the filename of your help menu, preceded (if necessary) by a drive letter and subdirectory path to the help menu file. To make the utility as **HELPful** as possible, however, its full syntax, including its multiple options, is

```
HELP filespec [...filespec][/Mn[/Nn[/P]] [/O]
```

As the multiple *filespec* above indicates, you can load more than one file of help or reference screens at once. Just separate the additional filenames with one or more spaces, tabs, commas, or semicolons as delimiters. By default, **HELP** sets aside room for four screen pages. When loading **HELP** initially, however, you can change this default by including the */Nn* option, which accepts values for *n* from 1 to 14.

The default hotkey to activate a **HELP** pop-up is Alt-H. Hitting Esc or hitting the hotkey again returns you to your application. Since one of the problems with using resident programs is that they often fight over the same hotkey combination, I designed **HELP** to allow you to change the Alt-key combination without clumsy **DEBUG** patches. Just include the */Hn* hotkey switch on the command line, using any alphanumeric key, the Minus key, or the Equal Sign key for *n*. Indeed, even after loading **HELP** you can change its hotkey at any time, without having to load a new help screen or uninstall it, simply by entering **HELP/Hn**.

## ■ PC LAB NOTES

Then pop up the help screen and use the PgUp and PgDn keys to navigate through the pages of help. Home and End will quickly take you to the first and last pages. The help pages will be in the same order as the filenames were entered on the command line. The first time you pop up HELP, the first page will be displayed. Thereafter, however, if you have flipped to another page, HELP will remember that as the current page to bring up the next time you reach for the HELP hotkey.

HELP displays a message to let you know when it has been successful in loading and making your help file(s) resident. Another short message is displayed if the program fails to find any of the files you specified. The number of active pages is also shown, and, after installation, the number of reserved pages is displayed, along with the copyright notice.

**MEMORY REQUIREMENTS** As indicated above, HELP defaults to reserving room for four pages. The program itself needs 1K for code and an additional 4K to store the current screen contents so they can be restored on exit. Each help page

(screen) requires an additional 4K, so a total of approximately 21K of resident RAM is requisitioned by the default four-page mode. You can save usable RAM by adding the /N switch when installing HELP. For example, to reserve just one page for the help file MENU.HELP, you would enter

## HELP MENU.HELP/N1

10K RAM will be used in this minimum one-page configuration.

You can also do just the opposite and reserve more than four pages even if, at the moment, you are loading fewer than the permissible number of files. You might enter, for example,

## HELP MENU.HELP/N8

The reason you might want to do this is that once HELP has been installed, new help files can be loaded in memory, writing over the old help screens, as long as there is enough reserved room. The command syntax is the same. Just enter HELP followed by a list of filenames. The amount of reserved pages, however, cannot be changed after installation without deinstallation. So if you entered the above

command with the /N1 reserved page switch, and you later entered HELP MENU1.HELP MENU2.HELP, the first file would be loaded, but there would not be room for the second. (During installation, if you include more than four help files on the command line, HELP makes enough room to store the additional help screens without your having to add the explicit /N instruction.)

HELP is smart enough to know if it's been previously installed and will install itself once. If you install and wish to change the reserved pages or you just forgot how many pages are reserved, HELP can be easily uninstalled by entering HELP/U at the DOS prompt. You can then reinstall the program with a new configuration—subject to one important caveat. If you have installed another resident program after HELP (and SideKick, if you use it, insists on being last), remember that you must always uninstall your TSRs in the reverse order of loading. Only thus can you avoid holes in the RAM and a possible crash resulting from lost keyboard chaining. [Jeff Prossie's *INSTALL* and *REMOVE* programs, in the PC Lab Notes of

```

1      Help.asm
2      Resident help facility
3      %include "filespec"
4      %define FILESPEC "%1\%2\%3"
5      %define FILESPEC "%1\%2\%3"
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200   %define FILESPEC "%1\%2\%3"

```

HELP.ASM: The assembly language source code for HELP.COM.

```

POP_1T:  POPFH      ;On return save all registers
        POP DS      ;that will be used.
        POP ES
        POP AX
        POP DS
        POPF
        INT3        ;Return from interrupt.

;***** FILE LOADING AND INSTALL PROCEDURE *****;
REGISNG:  CMO      CLO
        POP DS      ;store our segment.
        POP DATA SEG ;Do we have 448?
        CMO DS,45311
        JA CS,PARA
        MOV SI,OFFSET BOOT_SEGMENT ;if no, exit with message.
        JMP SHORT EXIT

CR_PARA:  CMO BYTE PTR DS:[REG],0 ;Any parameters?
        JNC CR_EXIT
        MOV SI,OFFSET STATUS
        CMO STATUS_EXIT ;if no, exit with status message.
        JMP SHORT EXIT

;*****;
; Check user vectors to see if we are installed or if one is available ;
;*****;
CR_FREE:  MOV AL,48H + 1 ;Available vectors are 48H - 47H.
        PUSH DS,INT:10C
        MOV AX,35H
        INT 21H ;Get vector address.
        CMO DS,0 ;Is offset being used?
        JNC CR_SIGNATURE ;if yes, use if it's us.
        MOV DS,0 ;Is segment being used?
        CMO CR_SIGNATURE ;if yes, use if it's us.
        MOV DATA,INT:10C ;if available, save INT number.
        JMP SHORT CR_EXIT

NEXT_USER: CMO AL,47H ;Have we checked all?
        PUSH DS,INT:10C ;if no, next one.
        MOV CR,CR_SIGNATURE
        JMP SHORT CR_SWITCHES

CR_SIGNATURE: MOV DI,0 ;See if INT has our signature.
        MOV SI,100H
        MOV CX,31/2
        REP CMPSB
        JNC NEXT_USER ;if yes, already installed.
        MOV DATA,REG,0 ;save segment.
        MOV INSTALLAL_FLAG,1

;*****;
; Check the command line for switch options. ;
;*****;
CR_SWITCHES: PUSH DATA,REG
        POP ES
        MOV SI,010H ;First point to installed segment.
        ;First parameter.
        NEXT_SWITCH: LODSB ;Load a byte.
        CMO AL,13 ;Is it carriage return?
        JE CR_FILENAMES ;if yes, done here.
        CMO AL,"/" ;Is it switch character?
        JNC NEXT_SWITCH ;if no, get next byte.
        LODSB ;else get switch.
        CMO AL,13 ;Is it carriage return?
        JE CR_FILENAMES ;if yes, done here.
        CALL CAPITALIZE ;else capitalize.
        CMO AL,"0" ;Is it "0"?
        JNC CR_0
        CMO INSTALLAL_FLAG,1 ;if yes, are we installed?
        JNC NEXT_SWITCH ;if yes, uninstall.
        CR_0: CMO AL,"0" ;Is it "0"?
        JE CR_0
        CMO CR_0 ;if yes, are we installed?
        CALL NEXT_SWITCH ;if yes, can't change reserved.
        MOV DS,0 ;else, convert decimal to hex.
        CMO CR_0,14 ;if yes, greater than 14 pages
        MOV NEXT_SWITCH ;to equal to zero?
        CMO CR_0,0
        JE NEXT_SWITCH
        RESERVED_PAGES,01 ;if yes, ignore.
        JMP SHORT NEXT_SWITCH ;else, save reserved pages.

CR_P: CMO AL,"P" ;Is it "P"?
        JNC CR_P
        MOV PUSHUP_FLAG,1 ;if yes, flag to pop-up immediately.

CR_M: CMO AL,"M" ;Is it "M"?
        JNC NEXT_SWITCH
        DEC SI ;Adjust in case it's just CR.
        CALL CAPITALIZE
        MOV DI,OFFSET SCAR_CODES
        CMO CR_0,30 ;Is possible Alt key combos.

NEXT_ALT: SCASB ;Do we have a match?
        JE GOT_ALT
        DEC DI
        NEXT_ALT: NEXT_ALT
        JNC SHORT NEXT_SWITCH ;if no, bump pointer to next byte.

GOT_ALT: MOV ALT_COMBO + 10,AL ;store Alt key.
        MOV AL,[DI] ;Get next code
        MOV SI,OFFSET NEXT_ALT ;and store.

```

(HELP ASM.COM/MESS)

(HELP.ASM continues)



```

CALL      DISPLAY_TEXT
RET

GOT FILE:  MOV     BX,AX                ;Filehandle in BX.
NEXT_READ: CALL     READ_BYTE          ;Read it.
          JZ      CLOSE_FILE          ;Done here if nothing read.
          CALL     GET_BALANCE         ;If none, read balance. If any,
          JNC     NEXT_READ            ;into next page.

CLOSE_FILE: MOV     AX,0                ;Close file.
END_READ: RET

```

```

; This subroutine does the actual reading of help files into storage :

```

```

READ_7F:      MOV     CL,PAGE_COUNT          ;Retrieve page count.
              SUB     ESI,EAX             ;Convert to offset.
              SHL     EBX,8               ;
              MOV     EDI,ESI              ;
              JZ      $                   ;
              MOV     CL,00H              ;Point to storage segment.
              MOV     AX,SPB              ;Read start bytes.
              INT     21H                 ;
              JC      READ_SED            ;
              CMP     AX,0                 ;Did we read anything?
              JB      READ_SED            ;
              INC     CL,PAGE_COUNT        ;If yes, increment page count.
              MOV     CX,CL                ;How it's full page?
              REP     SCASB                ;
              JE      $                   ;If no, pad balance with nulls.
              DEC     DI,EA
              ADD     DI,AX
              XOR     AL,AL
              NEP     STOSB
              CLC                           ;Indicate read something.
              JMP     SNOOT_READSTORE_DS

;-----
READ_SED:     SVC                         ;Indicate nothing read.
              PUSH    CS                  ;Restore data segment.
              POP     DS

```

```

*****
; This subroutine checks for free storage space.
*****

```

```

CS _SPACE:    CMP     PAGE_COUNT,16           ;Already a fail! Is pages?
              JE      NO_SPACE                ;if yes, no space.
              JNB     INSTALLED_FLAG,1       ;Are we installed.
              JMP     SPACE
              AL,8+RESERVED_PAGES            ;if yes, are reserved pages full
              CMP     AL,PAGE_COUNT          ;if yes, no space.
              JE      NO_SPACE               ;Else, there is space.
              CLC
              RET

NO_SPACE:     STC

```

```

*****
! This subroutine calculates the page offsets.
! When used it is recommended to open with my = offset +

```

```
PAGE_SIZE:  MOV    AX,0000           ;Multiply by 4096 bytes.
              SHL    DX,04
              MOV    CX,CX
              MUL    CX
              MOV    DX,OFFSET PAGE_BUFFER ;Add to page buffer offset.
              ADD    DX,AX
              RET
```

```
[ This subroutine converts Decimal to hex. ]  
[*****] [*****] [*****] [*****]
```

```

NEXT_NUMBER:  LODDS
               CDP AL,"%" ;    ;set a byte.
               J9 END_NUMBER ;    ;is it a number?
               CDP AL,"%"
               J9 END_NUMBER
               SUB AL,"%" ;    ;if you convert to ja.
               RCB9 AL,AL ;    ;how it.
               SUB ADI,AD ;    ;multiply previous by 10.
               MOV UL,I9
               MCL DL
               SC99 AL,AL ;    ;retrieve current number.
               AND AL,AL ;    ;add add to total.
               J9P RIGHT NEXT_NUMBER
END_NUMBER:   DEC RET ;    ;adjust pointer.

```

```

; This subroutine checks the command line for delimiters. ;
;-----

```

```

MOV     DI,OFFSET DELIMITER      ;Point to delimiters.
MOV     CX,6
AHEAD:  SCASB                     ;And one if match.
JNE     NO_DELIMITER
MOV     BYTE PTR [DI-1],0         ;If yea, convert to ASCII.
STC
RET
NO_DELIMITER:
CLC

```

```
[XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX]
| This subroutine capitalizes the character in AL |
```

```

CAPTAGIER:  CNF  AL, "a"
             JB  END CAPS
             CNF  AL, "a"
             JA  END CAPS
             AND  AL, 5FH

```

```
-----J
| THIS suboutine stores the screen so it can be restored on exit. |
|-----J
```

```

STORE_SCREEN: MOV     LINE_COUNT,25           ;25 lines to save.
               MOV     SX,STATUS_REG         ;Retrieve status register.
               MOV     AX,SCREEN_SEG         ;Point to screen buffer.
               MOV     DS,AX
               PUSH    CS                    ;Point to storage segment.
               POP     AX
               ZMW     $1,$1                 ;Stop left corner.
               MOV     DI,OFFSET SCREEN_BUFFER ;Point to storage offset.

```

```

CALL LIMB1: MOV     $F, $F($C1, %C0) ;Initialize column counts.
             MOV     $X, $X             ;Save address of $X columns.

MORE_RETRY: IN      $A, $X             ;Get status.
             TEST    $A, 1             ;Is it low?
             JNE     $END_RETRY        ;If no, wait until it is.
             CLI     ;No more interrupts.

```

```
TEST AL,1           ;Is it high?
JB WAIT1            ;If no, wait until it is.
LODSB                ;Retrieve a word.
STI                  ;Interrupts back on.
STOSB                ;Store the character/attribute.
```

```

JX      EPORT_COLD1      ;Was it less than 0?
LOOP    BORI_RET1        ;if no, loop until row done.

SRL     SP,1              ;Convert balance to a word.
ADD     SI,SP              ;Add to address offset.

```

```
SHORT_COL$1:   DBL      CM          ;Adjust balance.  
               SBL      CM,1       ;Convert to a word.  
               ADD     CM,CM        ;Add to previous offset.
```

```
CE_LINESI: DEC     REG_LINE_COUNT      ;Dec all 20 lines.  
           JNE     NEXT_LINEI  
  
           PUSH    CS                  ;Restore data segment.  
           POP     DS
```

```

[-----]
: This subroutine writes to the screen buffer :

```

```
WRITE_SCREEN: MOV     LINE_COUNT,25           ;25 lines to save.
               OR,STATUS_REG                 ;Retrieve status register.
               MOV     AX,SCREEN_REG         ;Point to screen buffer.
               MOV     ES,AX
               MOV     DI,01                 ;Top left corner.
```

```

NEXT_BYTE:    MOV     EDI,CX_00000000      ;Initialize screen column.
              MOV     CX,8E                ;Write maximum of 84 columns.

NEXT_BYTE:    LODSW                          ;Get a byte.
              MOV     BX,AX                ;Store it in BX.

```

```

MORE_RET2:   IN      AL,DX           ;Get status.
             TEST    AL,1           ;Is it low?
             JNB     MORE_RET2      ;If no, wait until it is.
             CLI                     ;No more interrupts.

```

```

TEST    AX,AX      ;Get status!
JZ       AX,1       ;Is it high?
MOV      AX,AX      ;If so, wait until it is.
JMP      AX,AX      ;Retrieve the word
STOSW    ; and store it.
STI      ;Interrupts back on.

```

```

DEC    BP                ;Decrement screen column count.
JE      $NEXT_COLS$      ;Was it less than 88?
LOOP   $NEXT_BYTE$       ;if no, loop until row done.

SHL     BP,1             ;Convert balance to a word.
ADD     DI,BP            ;Add to storage offset.
JMP     $NEXT_CH_LIN$    ;

```

```

CE_LINES1:  SET      CE              (Reset wordcount)
            SET      CE,1        (Convert to a word)
            ADD      SI,CE        (Add to screen offset)
CE_LINES2:  SET      LINE_COUNT   (0 to all 25 lines)
            JMS      NEXT_LINES
            RET

```

```
SCREEN_BUFFER LABEL BYTE
PAGE_BUFFER EQU SCREEN_BUFFER + ( 2 * 10 * 25 )

CODE END
```

## ■ PC LAB NOTES

August 1987, facilitate multiple deinstallations.—Ed.]

**GETTING HELP** Both the assembly language source code, HELP.ASM, and a BASIC program (HELP.BAS) that will create HELP.COM for you automatically are listed in this article. However, the easiest way to obtain a copy of either of these files, or a ready-to-run copy of HELP.COM itself, is to download them from the PC Magazine Interactive Reader Service, as explained in the accompanying sidebar.

If you intend to use a number of different help menus, it's probably best to put them all in a single directory, \HELP. This facilitates their implementation through batch files. Suppose, for example, that

you've created some help screens you want loaded on boot to aid a novice in using your applications. You can take advantage of HELP's /P immediate pop-up switch, along with the following instructions placed at the end of the AUTOEXEC.BAT:

```
CD \HELP
HELP MENU/P > NULL
CD \
```

The redirection of HELP's output to the null device suppresses the screen echo of HELP's own install message. Your MENU file, for example, might contain the appropriate instructions to load either a spreadsheet or a word processing program. Then you could generate two additional

batch files on the following model:

```
123.BAT                                WS.BAT
-----                                -----
CD \HELP                               CD \HELP
HELP 123.HEP                           HELP WS.HEP
CD \123                                CD \WS
123                                     WS
CD HELP                                CD HELP
HELP MENU/P                             HELP MENU/P
```

You would create the help menus, 123.HEP and WS.HEP, using an ASCII word processor and the CAPTURE program presented in this issue's Utilities column. (The .HEP extension is not required by HELP; it's just the convention I'm using here to avoid creating problems with the industry standard of .HLP.) These two batch files would load the help that is rele-

```
188 REM --- BASIC PROGRAM TO CREATE help.com
189 GOSUB help.com:GO TO $1 LEN = 1
190 FIELD #1,1 AS A$
191 CHECKSUM = 0
192 FOR J = 1 TO 231
193   LINE$ = ""
194   LINE$ = LINE$ + " "
195   PRINT " "
196   FOR K = 1 TO 8
197     READ BYTE
198     CHECKSUM = CHECKSUM + BYTE
199     LINE$ = LINE$ + " "
200     IF (BYTE < 256) THEN LET AS = CHR$(BYTE)
201     PRINT " "
202   NEXT K
203   READ LINECHECK
204   IF LINECHECK <> LINE$ THEN PRINT "Error in Line":288 + 10 * I
205 NEXT I
206 CLOSE
207 PRINT CHECKSUM = 173468 THEN PRINT "Successful Completion!":END
208 PRINT "COM file is not valid!":END
290 DATA 231, 195, 3, 72, 69, 76, 86, 32, 760
300 DATA 49, 48, 48, 32, 48, 39, 41, 32, 187
310 DATA 49, 57, 56, 55, 32, 98, 109, 182, 546
320 DATA 182, 32, 47, 111, 109, 109, 117, 118, 757
330 DATA 182, 97, 46, 105, 111, 118, 115, 858
340 DATA 182, 97, 46, 13, 18, 83, 117, 107, 858
350 DATA 99, 99, 181, 115, 115, 102, 117, 108, 858
360 DATA 189, 121, 32, 185, 116, 115, 116, 97, 884
370 DATA 188, 188, 181, 188, 13, 18, 86, 514, 634
380 DATA 181, 115, 115, 32, 65, 108, 116, 32, 684
390 DATA 72, 32, 116, 111, 32, 97, 99, 116, 678
400 DATA 188, 189, 181, 182, 38, 8, 28, 573
410 DATA 17, 185, 99, 184, 97, 181, 188, 32, 723
420 DATA 74, 46, 32, 97, 181, 182, 182, 11, 465
430 DATA 114, 188, 8, 8, 87, 8, 8, 214
440 DATA 8, 8, 8, 178, 25, 8, 8, 248, 441
450 DATA 8, 8, 8, 8, 8, 8, 25, 8, 28
460 DATA 8, 8, 1, 8, 8, 8, 9, 32, 46
470 DATA 13, 44, 99, 47, 18, 85, 115, 97, 470
480 DATA 181, 181, 98, 11, 32, 72, 49, 76, 541
490 DATA 38, 182, 185, 188, 181, 115, 112, 755
500 DATA 181, 99, 32, 91, 46, 46, 32, 493
510 DATA 182, 189, 189, 181, 115, 112, 101, 99, 841
520 DATA 93, 91, 47, 78, 118, 93, 91, 47, 458
530 DATA 72, 118, 93, 91, 47, 88, 93, 22, 418
540 DATA 124, 32, 91, 47, 85, 93, 13, 18, 458
550 DATA 18, 47, 78, 118, 32, 119, 184, 181, 481
560 DATA 114, 181, 32, 110, 32, 61, 32, 118, 562
570 DATA 117, 189, 189, 181, 115, 112, 101, 99, 841
580 DATA 32, 114, 181, 115, 101, 114, 118, 181, 798
590 DATA 189, 32, 112, 97, 182, 181, 115, 32, 892
600 DATA 49, 48, 48, 32, 48, 39, 41, 32, 187
610 DATA 188, 181, 182, 97, 117, 108, 114, 32, 713
620 DATA 61, 32, 52, 13, 18, 47, 72, 118, 97
630 DATA 112, 184, 32, 114, 115, 116, 117, 118, 713
640 DATA 32, 81, 32, 65, 108, 116, 32, 184, 558
650 DATA 111, 116, 32, 187, 181, 121, 32, 99, 719
660 DATA 111, 111, 98, 11, 32, 118, 713
670 DATA 99, 44, 48, 45, 57, 44, 34, 45, 487
680 DATA 24, 44, 24, 41, 34, 41, 59, 32, 339
690 DATA 188, 188, 188, 188, 188, 188, 188, 188, 188, 188
700 DATA 61, 32, 72, 13, 18, 47, 88, 32, 247
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710 DATA 32, 61, 32, 185, 189, 189, 181, 188, 449
720 DATA 189, 97, 116, 32, 112, 111, 112, 786
730 DATA 45, 117, 112, 13, 18, 47, 89, 32, 461
740 DATA 32, 61, 32, 117, 118, 185, 116, 115, 482
750 DATA 116, 116, 116, 116, 116, 116, 116, 116, 116, 116
760 DATA 115, 181, 58, 32, 88, 183, 85, 112, 486
770 DATA 32, 88, 183, 48, 118, 32, 72, 111, 488
780 DATA 189, 181, 48, 118, 388, 32, 116, 487
790 DATA 111, 32, 187, 97, 118, 185, 183, 97, 773
800 DATA 116, 181, 32, 116, 184, 114, 111, 117, 811
810 DATA 183, 38, 32, 76, 184, 32, 76, 184
820 DATA 18, 32, 32, 32, 32, 32, 69, 83, 322
830 DATA 47, 32, 111, 114, 32, 184, 115, 116, 487
840 DATA 181, 32, 116, 116, 116, 116, 116, 116, 116, 116
850 DATA 181, 128, 185, 116, 18, 8, 32, 97, 581
860 DATA 99, 114, 185, 118, 181, 32, 112, 97, 788
870 DATA 181, 48, 119, 41, 13, 18, 8, 423
880 DATA 32, 116, 111, 116, 97, 188, 32, 112, 784
890 DATA 97, 181, 181, 48, 119, 41, 13, 18, 8, 423
900 DATA 18, 32, 72, 69, 76, 86, 32, 349
910 DATA 99, 97, 118, 35, 116, 32, 98, 181, 692
920 DATA 189, 116, 116, 116, 116, 116, 116, 116, 116, 116
930 DATA 188, 181, 188, 46, 13, 18, 45, 571
940 DATA 118, 118, 118, 118, 118, 118, 118, 118, 118, 118
950 DATA 114, 32, 112, 114, 111, 183, 114, 97, 799
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1930 DATA 118, 118, 118, 118, 118, 118, 118, 118, 118, 118
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2100 DATA 118, 118, 118, 118, 118, 118, 118, 118, 118, 118
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2430 DATA 118, 118, 118, 118, 118, 118, 118, 118, 118, 118
2440 DATA 118, 118, 118, 118, 118, 118, 118, 118, 118, 118
2450 DATA 118, 118, 118, 118, 118, 118, 118, 118, 118, 118
2460 DATA 118, 118, 118, 118, 118, 118, 118, 118, 118, 118
2470 DATA 118, 1
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want to each application program.

If the help is for your own use and you need it only for one application, you might create a batch file like this:

### 123.BAT

```
CD \HELP
HELP TAXES.MFJ TAXES.SNG TAXES.MFS
CD \123
CD \HELP
HELP/U
CD \
```

This batch file would load the tax schedules for married filing joint, single, and married filing separate; load Lotus 1-2-3; and then free up memory by uninstalling HELP when you are finished with your tax work.

A somewhat esoteric use for HELP is to hide a private document from roving eyes. If someone walks into your office unexpectedly while you are reading a confidential memo, working on a salary proposal, or editing the payroll spreadsheet, rather than hastily exiting and losing your place in your work, just a simple press of Alt-H will pop-up the help screen over your sensitive work without drawing undue attention to your action.

**UNDERSTANDING HELP** In its inner workings HELP has to do a little dancing in order to deliver all the user options it contains. There are two main parts to the program, the command line parser that loads the help pages and makes them resi-

dent, and the INT 9h keyboard interceptor that pops up and lets you page through the stored information.

First, the loader. An Alt keystroke is stored in the keyboard buffer with an ASCII value of zero. The only way to interpret them is from the extended scan codes. Unfortunately, these scan codes are based on the matrix layout of the IBM keyboard, and so bear no relation to alphanumeric order. Instead of forcing the user to enter the scan code to change to his favorite Alt hot-key combo, therefore, HELP simply uses an internally stored translation table.

To make it possible to uninstall HELP, one of the eight user-defined interrupts (INT 60h through INT 67h) is used as a pointer to the program's resident code and

|                                                         |                                                          |
|---------------------------------------------------------|----------------------------------------------------------|
| 1320 DATA 180, 1, 205, 22, 116, 18, 400, 8, 594         | 1370 DATA 184, 9, 53, 205, 33, 137, 208, 114, 765        |
| 1330 DATA 117, 6, 159, 2, 139, 2, 216, 47, 518, 2, 248, | 1420 DATA 184, 9, 37, 205, 33, 138, 14, 138, 755         |
| 1340 DATA 235, 113, 100, 8, 205, 12, 100, 8, 959        | 1470 DATA 184, 9, 37, 205, 33, 138, 14, 138, 755         |
| 1350 DATA 126, 1, 1, 100, 6, 125, 1, 8, 458             | 1520 DATA 1, 232, 182, 8, 198, 216, 2, 232, 95           |
| 1360 DATA 235, 88, 3, 138, 16, 138, 1, 204, 863         | 1570 DATA 198, 9, 3, 232, 122, 8, 676                    |
| 1370 DATA 201, 232, 5, 3, 139, 246, 232, 143, 1197      | 1620 DATA 232, 254, 8, 177, 4, 211, 234, 66, 1178        |
| 1380 DATA 3, 100, 8, 205, 12, 128, 252, 1, 751          | 1670 DATA 184, 8, 49, 205, 33, 184, 9, 52, 717           |
| 1390 DATA 116, 97, 98, 38, 134, 6, 116, 91, 571         | 1720 DATA 198, 9, 129, 251, 232, 1, 198, 234, 127        |
| 1400 DATA 139, 14, 139, 1, 128, 252, 73, 117, 861       | 1770 DATA 1, 117, 154, 140, 192, 59, 844                 |
| 1410 DATA 7, 120, 249, 1, 116, 31, 254, 201, 987        | 1820 DATA 6, 129, 1, 117, 146, 142, 6, 129, 676          |
| 1420 DATA 128, 252, 95, 117, 6, 108, 1, 140, 1, 140     | 1870 DATA 198, 9, 73, 205, 33, 198, 131, 473             |
| 1430 DATA 1, 114, 18, 284, 193, 128, 252, 71, 1033      | 1920 DATA 119, 3, 232, 69, 8, 38, 139, 22, 618           |
| 1440 DATA 117, 2, 177, 1, 128, 252, 75, 117, 873        | 1970 DATA 114, 1, 38, 142, 38, 116, 1, 184, 626          |
| 1450 DATA 6, 198, 134, 140, 1, 138, 1, 138, 1, 138      | 2020 DATA 198, 9, 205, 33, 195, 232, 1842                |
| 1460 DATA 1, 235, 176, 198, 56, 8, 232, 71, 969         | 2070 DATA 154, 218, 142, 128, 100, 37, 205, 33, 1876     |
| 1470 DATA 3, 100, 6, 125, 1, 8, 198, 6, 537             | 2120 DATA 14, 31, 198, 56, 3, 179, 8, 233, 784           |
| 1480 DATA 1, 9, 93, 89, 84, 98, 89, 588                 | 2170 DATA 93, 205, 138, 217, 128, 251, 14, 173           |
| 1490 DATA 91, 88, 7, 31, 157, 287, 252, 34, 847         | 2220 DATA 8, 179, 49, 232, 12, 8, 128, 235, 842          |
| 1500 DATA 143, 6, 139, 1, 131, 252, 253, 119, 1034      | 2270 DATA 198, 138, 211, 128, 194, 48, 232, 1, 982       |
| 1510 DATA 6, 198, 134, 3, 232, 128, 74, 216, 74         | 2320 DATA 2, 232, 214, 205, 128, 138, 138, 138           |
| 1520 DATA 62, 128, 8, 8, 117, 6, 198, 148, 651          | 2370 DATA 248, 255, 172, 128, 208, 128, 256, 8, 1399     |
| 1530 DATA 1, 233, 57, 1, 176, 95, 254, 192, 1089        | 2420 DATA 117, 245, 195, 232, 95, 8, 114, 45, 1843       |
| 1540 DATA 13, 205, 33, 138, 201, 8, 137, 97, 1197       | 2470 DATA 139, 22, 135, 1, 4, 184, 6, 61, 616            |
| 1550 DATA 16, 140, 194, 132, 254, 8, 137, 9, 857        | 2520 DATA 205, 32, 115, 17, 198, 6, 137, 1, 712          |
| 1560 DATA 162, 191, 1, 48, 183, 117, 231, 205, 1040     | 2570 DATA 1, 139, 242, 232, 228, 255, 198, 108, 1379     |
| 1570 DATA 21, 139, 253, 198, 3, 1, 189, 15, 887         | 2620 DATA 198, 9, 214, 205, 128, 138, 138, 138           |
| 1580 DATA 8, 243, 167, 117, 238, 148, 6, 129, 1640      | 2670 DATA 12, 8, 114, 5, 232, 54, 8, 115, 532            |
| 1590 DATA 1, 198, 6, 132, 1, 1, 355, 54, 648            | 2720 DATA 246, 188, 62, 205, 33, 195, 138, 14, 1073      |
| 1600 DATA 129, 1, 1, 198, 129, 8, 172, 68, 408          | 2770 DATA 143, 1, 232, 68, 6, 6, 31, 185, 464            |
| 1610 DATA 13, 116, 99, 68, 47, 117, 247, 172, 871       | 2820 DATA 158, 15, 188, 63, 205, 33, 114, 25, 795        |
| 1620 DATA 117, 13, 116, 98, 232, 121, 2, 48, 49         | 2870 DATA 41, 8, 8, 116, 28, 48, 254, 6, 583             |
| 1630 DATA 85, 117, 149, 128, 62, 232, 1, 1, 536         | 2920 DATA 143, 1, 43, 238, 114, 8, 129, 258, 899         |
| 1640 DATA 117, 228, 232, 56, 1, 68, 78, 117, 898        | 2970 DATA 3, 248, 59, 192, 243, 178, 248, 235, 1389      |
| 1650 DATA 28, 128, 62, 132, 1, 1, 116, 214, 148         | 3020 DATA 1, 245, 14, 31, 195, 128, 62, 141, 821         |
| 1660 DATA 232, 45, 7, 128, 253, 14, 159, 25, 987        | 3070 DATA 14, 116, 19, 128, 62, 132, 1, 473              |
| 1670 DATA 128, 251, 8, 116, 291, 138, 39, 159, 1001     | 3120 DATA 1, 117, 19, 38, 148, 139, 1, 50, 524           |
| 1680 DATA 1, 225, 195, 63, 88, 117, 5, 198, 891         | 3170 DATA 5, 141, 1, 114, 2, 249, 195, 249, 958          |
| 1690 DATA 6, 133, 1, 48, 72, 117, 182, 572              | 3220 DATA 198, 148, 195, 188, 1, 218, 58, 237, 1182      |
| 1700 DATA 172, 78, 232, 59, 2, 191, 157, 3, 894         | 3270 DATA 243, 205, 286, 216, 23, 3, 288, 195, 1383      |
| 1710 DATA 185, 38, 8, 174, 116, 5, 71, 226, 815         | 3320 DATA 258, 219, 372, 48, 48, 114, 28, 48, 743        |
| 1720 DATA 258, 235, 183, 182, 48, 1, 189, 1, 1034       | 3370 DATA 57, 119, 18, 48, 118, 1, 185, 58, 467          |
| 1730 DATA 38, 162, 134, 1, 235, 152, 198, 129, 1441     | 3420 DATA 228, 178, 10, 248, 226, 134, 105, 2, 1219      |
| 1740 DATA 8, 232, 5, 2, 114, 16, 137, 54, 564           | 3470 DATA 216, 235, 235, 78, 195, 172, 191, 142, 1480    |
| 1750 DATA 139, 1, 232, 75, 1, 128, 252, 183, 1034       | 3520 DATA 198, 148, 195, 188, 1, 218, 58, 237, 1182      |
| 1760 DATA 89, 232, 75, 1, 80, 94, 60, 13, 647           | 3570 DATA 48, 255, 6, 249, 195, 248, 195, 1468           |
| 1770 DATA 116, 11, 48, 47, 117, 327, 232, 138, 1844     | 3620 DATA 48, 97, 314, 6, 88, 132, 135, 2, 588           |
| 1780 DATA 1, 178, 245, 198, 1, 114, 142, 184, 183       | 3670 DATA 198, 9, 198, 6, 118, 1, 185, 58, 467           |
| 1790 DATA 102, 132, 1, 1, 1, 116, 9, 58, 587            | 3720 DATA 139, 22, 128, 1, 161, 122, 1, 142, 788         |
| 1800 DATA 198, 1, 138, 1, 142, 139, 1, 563              | 3770 DATA 216, 14, 124, 1, 51, 244, 182, 56, 8, 789      |
| 1810 DATA 68, 12, 38, 142, 38, 142, 184, 183            | 3820 DATA 19, 46, 118, 1, 161, 122, 1, 142, 788          |
| 1820 DATA 38, 198, 6, 138, 1, 1, 235, 7, 624            | 3870 DATA 238, 168, 1, 117, 251, 258, 234, 168, 1427     |
| 1830 DATA 128, 63, 132, 1, 1, 117, 24, 128, 53          | 3920 DATA 1, 116, 251, 173, 251, 171, 77, 118, 1156      |
| 1840 DATA 62, 132, 1, 1, 117, 17, 38, 167               | 3970 DATA 198, 138, 211, 128, 194, 48, 232, 1, 982       |
| 1850 DATA 6, 125, 1, 1, 1, 154, 255, 38, 127, 791       | 4020 DATA 9, 73, 209, 225, 3, 249, 38, 244, 984          |
| 1860 DATA 1, 179, 8, 68, 1, 116, 51, 68, 467            | 4070 DATA 14, 124, 1, 117, 211, 14, 31, 195, 78, 787     |
| 1870 DATA 1, 178, 148, 1, 116, 138, 1, 71, 983          | 4120 DATA 1, 128, 1, 116, 138, 1, 128, 1, 128, 623       |
| 1880 DATA 288, 178, 10, 232, 228, 8, 232, 133, 1245     | 4170 DATA 1, 161, 122, 1, 142, 192, 51, 255, 935         |
| 1890 DATA 1, 198, 198, 2, 232, 198, 8, 88, 929          | 4220 DATA 198, 138, 211, 128, 194, 48, 232, 1, 982       |
| 1900 DATA 128, 62, 132, 1, 1, 137, 38, 137, 887         | 4270 DATA 198, 138, 211, 128, 194, 48, 232, 1, 982       |
| 1910 DATA 1, 116, 15, 128, 62, 132, 1, 1, 8, 454        | 4320 DATA 238, 168, 1, 116, 251, 139, 195, 171, 1277     |
| 1920 DATA 117, 34, 198, 73, 379, 1, 232, 889            | 4370 DATA 251, 177, 71, 116, 8, 226, 233, 209, 239, 1434 |
| 1930 DATA 192, 8, 138, 198, 186, 293, 3, 209, 128       | 4420 DATA 3, 273, 3, 209, 128, 62, 132, 1, 473           |
| 1940 DATA 161, 44, 8, 142, 192, 188, 73, 205, 977       | 4470 DATA 241, 254, 14, 124, 1, 117, 209, 195, 1155      |
| 1950 DATA 33, 198, 131, 3, 134, 231, 106, 8, 898        |                                                          |
| 1960 DATA 1, 148, 131, 3, 148, 37, 285, 33, 148         |                                                          |

(HELP.BAS ends)

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## ■ PC LAB NOTES

reserved pages. [Although INT 67h is technically "user-defined," it is used by EMS memory.—Ed.] These interrupt vectors are initialized to zero at power-up, and the first thing HELP does is to determine whether they are still zero. If one is available (a zero indicates it's not already being used by another program), HELP takes note of the fact so that it can later install this vector as a pointer to its own code segment. When a nonzero vector is encountered, HELP looks to see if it points to an already-installed HELP. With this technique, HELP can keep advised whether or not it is already installed in memory or, if the /U request is entered, find and uninstall the current resident portion.

When HELP doesn't find itself already installed, it points the free user vector to its own code and hooks the INT 9h keyboard vector to its hotkey procedure. Thus, it can come alive when the Alt hotkey keyboard combination is detected later. The installed user interrupt that HELP installs actually never gets called, as do most interrupts. The vector just provides an assured two-word memory location low in the BIOS data area as an absolute storage location for HELP's pointer. If for some reason no free user interrupts are found, HELP will refuse to install, complaining that there probably are too many resident programs already installed.

After HELP reads up to 14 pages of help files into a buffer location at the end of its code, it frees up its copy of the environment and installs itself in memory with DOS function call 31h. This function is the same as the terminate-and-stay-resident INT 27h except for the fact that it returns an error code that can be checked from a batch file with an IF ERRORLEVEL test. HELP returns an error code of 0 if everything went as you expected and a 1 if there was some kind of problem.

Before installation, if the /P switch is found, HELP simulates an interrupt by pushing the flags onto the stack and making a far call to HELP's keyboard interrupt handler, so telling it to pop up immediately. Upon return (when Esc or the hotkey terminates the help screen) HELP, if not already installed, will install.

This is the only easy way for HELP to pass control to the keyboard interrupt handler because the terminate-and-stay-resi-

dent function (31h) returns control to DOS.

The next time HELP is entered, the resident portion will be found and the program will use the reserved resident space to read in any new help pages. An 80 by 25 column screen requires 4,000 bytes; 2,000 for text and 2,000 for the corresponding attributes. If a help file is greater than 4,000 bytes (one screen page), HELP will read the balance, if there is room, into the next page, continuing until the end of file is reached or, if already installed, to the end of reserved space. If a page is less than 4,000 bytes, HELP pads the balance with nulls so there always will be a clean display.

Deinstallation is a simple matter of returning the saved INT 9h vector and the user interrupt vector back to the way it was found and returning the resident segment of memory back to DOS.

**THE KEYBOARD HANDLER** HELP's keyboard handler is a fairly standard TSR INT 9 hardware hook. The INT 9 vector is stored and HELP's vector is put in its place. When a key is struck, HELP gets control and simulates an interrupt of its own by pushing the flags on the stack and making a far call to the old INT 9 keyboard handler. This assures that HELP will regain control (assuming some other hooked TSR doesn't itself gobble up the keystroke) and allows the BIOS to handle the complicated interpretation of keystrokes. On return, HELP then issues an INT 16 to see if the far call to INT 9 actually produced a keystroke. (Remember, for every INT 9 indicating a key was struck, there is a corresponding INT 9 for the key release.) If a keystroke is ready but it's not HELP's hotkey, HELP relinquishes control with an IRET and goes back to sleep. If the keystroke is HELP's hotkey, the following sequence of events occurs: the keystroke is plucked from the buffer; a busy flag is set to keep from reentering an already popped-up HELP with another hotkey combo; the current contents of the screen buffer are saved for later restoration; and the current help page is displayed.

To ensure a speedy response time, HELP blasts its pages directly to the screen buffer (checking, of course, for the horizontal retrace to accommodate the IBM 80-column color mode). Actually, a sepa-

## HELP BY MODEM

The programs published in *PC Magazine* can be downloaded by modem from the PC Magazine Interactive Reader Service. There is no charge for this service, but users are cautioned that these programs are copyright material and are made available only for individual, noncommercial use. You may make copies for others (including placement on noncommercial electronic bulletin boards), as long as no charge is involved. Making copies for any commercial purpose, however, is strictly prohibited.

The Eastern modem number for PC-IRS is (212) 696-0360. In the West, call (415) 598-9100. Set your modem and communications software to use 2400/1200/300 bps, 8 data bits, 1 stop bit, no parity. Files with a .COM, .EXE, or .ARC extension require use of the Xmodem error-checking protocol; files with .ASM or .BAS extensions can be downloaded using either regular ASCII or Xmodem.

If you use the Xmodem protocol, you can download **HELP.COM** directly, saving yourself the chore of typing or downloading either the .BAS or the .ASM version. **HELP.BAS**, whether entered from the magazine at your keyboard or downloaded from PC-IRS, will automatically create **HELP.COM** when run once in **BASIC**. **HELP.ASM**, also listed both here and on PC-IRS, allows you to modify the program but requires you to use a macro assembler (IBM or Microsoft, Version 2 or later) and the following commands:

```

MASH HELP;
LINK HELP;
EXE2BIN HELP HELP.COM

```

*Photocopy this page. Trim and hole-punch the copy and add it to your DOS manual.*



Michael J. Mefford

# HELP Command

1988/No. 1 (PC Lab Notes)

**Purpose:**

Pops up help or reference screens of the user's choice and design either in the middle of an application or at the DOS prompt. Screens suitable for use with **HELP.COM** are saved in the required file format by **CAPTURE.COM** (Utilities, 1988/No. 1).

**Format:**

**HELP filespec [...filespec][ /Nn ][ /Hn ][ /P ] [ /U ]**

**Remarks:**

*Filespec* is the filename, preceded if necessary by a drive name and path, of a user-customized help/reference file that has been saved using **CAPTURE**. Multiple help screens may be loaded for successive display by entering more than one *filespec* on the command line, separating each with a space, tab, comma, or semicolon. By default, **HELP** will accept four screen pages, each of which is 4,000 bytes in length. The optional */Nn* parameter may be entered to change this default *n* (4) to values from 1 through 14 pages. The PgUp, PgDn, Home, and End keys are used to display the various help screens. **HELP** remembers the last help screen accessed and will return to it immediately the next time the program is called up.

**HELP** is a memory-resident program and is normally loaded by being listed as a line in your **AUTOEXEC.BAT** file. Its default pop-up key (hotkey) is Alt-H. Other Alt-key combinations may be substituted for the default hotkey by entering the optional */Hn* parameter. Any alphanumeric key, the Minus Sign key, or the Equals Sign key may be used for *n*, and the substitution may be made either when the program is loaded or by entering **HELP /lin** at a subsequent DOS prompt. Pressing Esc or pressing the hotkey a second time returns you to your application or to DOS.

The optional */P* parameter causes the program to pop up immediately, and the */U* parameter unloads it from memory if no other resident program has been loaded after **HELP**.

**Note:** To change the number of screen pages reserved for pop up, it is necessary to uninstall **HELP** or to reboot. Up to the limit of the reserved pages, however, you can change the help screen(s) to be accessed simply by entering the command, together with a new *filespec*, at the DOS prompt.

## ■ PC LAB NOTES

rate, faster screen write could be used for the other modes that don't care if we check for horizontal retrace, but the retrace check procedure is faster than a speeding bullet as it is.

**SPECIAL CODE** If you've popped up *SideKick* in 40-column mode, you're aware of the problem of screen skewing. What happens is that when an 80-column format screen image is written to a 40-col-

umn mode screen buffer, the columns 41 through 80 end up spilling into the next row, making the window illegible. To handle such problems presented by the standard CGA 40- and EGA 120-column modes, I developed special screen read and write routines that, in effect, window one format into the other.

The CAPTURE utility (and the forthcoming PAINT) guarantees that each help file will be an 80-column mode image. That leaves only the target format for HELP to worry about. HELP retrieves the current display mode (CRT\_COLS in the .ASM listing) from the BIOS at absolute address 40:4A and takes the difference between the source image mode (always 80) and the screen mode. For the 40-column and 120-column modes, the difference will be either 40 columns wider or narrower. If the current mode is less than 80 columns (i.e., 40 columns), after writing 40 columns of the help image to the buffer HELP ignores the balance of the 80-column source image and goes to the next line. This continues with all 25 lines. You end up with only the left half of the help image on your 40-column display in this case, but that is certainly better than a completely scrambled screen.

In the case of screen modes wider than 80 columns, at the end of each displayed line, the balance (again 40) of the screen mode is added to the screen buffer offset before the next line is displayed. The effect is that the entire 80-column help window appears on the screen, but it is displayed on the left side. The remaining 40 columns of a 120-column EGA display remain intact with whatever was there when HELP was popped up. Note further that all the help files are 25 lines high, so in EGA 120 by 43-column mode, HELP will appear in the top left-hand corner. Since the same write routine is used to restore the screen on exiting HELP, a read routine similar to the write is used to save the screen image.

At this point, the only remaining problems are for you to create and then capture the 80- by 25-column screen image files for HELP to use. For that I turn you over to Tom Kihlken's discussion in this issue's Utilities column. □

*Michael J. Mefford is a contributing editor of PC Magazine.*

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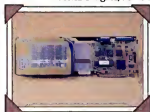
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## DOS 3.3 Commands

This DOS 3.3 Command Summary contains some commands and syntax that differ from prior or non IBM versions of DOS. Commands marked with an asterisk (\*) are external programs.

**PROMPT** \*—Set DOS prompt.

**SYNTAX** **PROMPT** [*prompt-text*]

PROMPT without parameter resets default DOS prompt. *prompt-text* can contain the following meta-string characters preceded by a \$ sign:

\$ % character  
t time  
d date  
p current directory  
v version number  
n default drive letter  
q character  
l character  
b character  
q character  
h backspace (erase previous character)  
e Escape character  
CRLF sequence

**RECOVER** \*—Recover defective disk.

**SYNTAX** **RECOVER** [*d*] [*pathfilename*] *ext*

—or—

**RECOVER** [*d*]

[*d*] [*pathfilename*] *ext* file(s) to recover  
*d* — recover all files on *d*

**RENAME** (REN) \*—Rename file(s).

**SYNTAX** **RENAME** [*d*] [*pathfilename*] *ext* [*filename*] *ext*

[*d*] [*pathfilename*] *ext* file(s) to rename  
*filename* *ext* new name

**REPLACE** \*—Selective copy.

**SYNTAX** **REPLACE** [*a*] [*pathfilename*] *ext* [*b*] [*path*] [*A*] [*P*]

[*a*] [*S*] [*W*]

[*b*] [*pathfilename*] *ext* source file(s)

[*b*] [*path*] target drive path

A copy source files that don't exist on target  
P prompt when file found on target  
R replace read-only files on target  
S search all directories of target  
W wait for source disk

**RESTORE** \*—Restore backup files.

**SYNTAX** **RESTORE** *a* [(*c*] [*pathfilename*] *ext* [(*S*] [*P*] [*B* mm-dd-yy] [*A* mm-dd-yy] [*M*] [*M*] [*L*:time] [*E*:time]

*a* — drive with BACKUP source

[*c*] [*pathfilename*] *ext* destination

S restore all files in subdirectories too

P prompt before restoring files changed since last backup or marked read-only

B restore if changed on or before date

A — restore if changed on or after date

M — restore if changed since backup

N restore if no longer on target

L restore if changed at or after time

E restore if changed at or before time

**RMDIR** (RD) \*—Remove directory.

**SYNTAX** **RMDIR** [*d*] *path*

[*d*] — drive to remove from

*path* directory to remove

**SELECT** \*—Set up DOS on new disk.

**SYNTAX** **SELECT** [(*A* B) [(*d*] [*path*] *xxx yy*

A or B source drive (default A)

[*d*] [*path*] target drive and path

*xxx* — country code

*yy* — keyboard code

**SET** \*—Put string in environment.

**SYNTAX** **SET** *name* = [*parameter*]

*name* — environment variable

*parameter* — value for environment variable

SET with just *name* clears *name* from environment

SET without parameters displays environment

**SHARE** \*—Support file sharing.

**SYNTAX** **SHARE** [*F*] [*filepath*] [*L*] [*locks*]

F *filepath* — set bytes to allocate for sharing information (default 2048)

L *locks* — set locks to allocate (default 20)

**SORT** \*—Filter, sorts text.

**SYNTAX** **SORT** [*R*] [*r*] [*a*]

R sort in reverse order

r *a* — sort starting with column *n*

**SUBST** \*—Assign drive letter to path.

**SYNTAX** **SUBST** *a*: *c: path*

—or—

**SUBST** *a*: *i*

—or—

**SUBST**

*e* drive letter to refer to path

*c: path* — drive/path referred to

D deletes substitution of *e*

NOTE SUBST without parameters displays substitutions

**SYS** \*—Put system files on disk.

**SYNTAX** **SYS** *e*:

*a* — drive to transfer system to

**TIME** \*—Set system time.

**SYNTAX** **TIME** [*hh*] [*mm*] [*ss*] [*xx*] [*xx*]

hh hours (0-23)

mm minutes (0-59)

ss seconds (0-59)

xx hundredths of a second (0-99)

**TREE** \*—Show all directory paths.

**SYNTAX** **TREE** [*c*] [*F*]

[*c*] — drive to display

F show filenames in all directories

**TYPE** \*—Send file to standard output.

**SYNTAX** **TYPE** [*d*] [*pathfilename*] *ext*

[*d*] [*pathfilename*] *ext* file to type

**VER** \*—Show DOS version.

**SYNTAX** **VER**

**VERIFY** \*—Verify disk writes.

**SYNTAX** **VERIFY** [(*ON* OFF)]

ON — verify that data was written correctly

OFF — do not verify (default)

VERIFY without parameters displays VERIFY status

**VOL** \*—Display volume label.

**SYNTAX** **VOL** [*d*]

[*d*] — display label of which drive

**XCOPY** \*—Selective copy.

**SYNTAX** **XCOPY** [*a*] [*pathfilename*] *ext* [*b*] [*path*]

[*filename*] [*ext*] [*A*] [*E*] [*M*] [*P*] [*S*] [*V*] [*W*]

—or—

**XCOPY** [*a*] [*pathfilename*] *ext* [*b*] [*pathfilename*] *ext*] [*A*]

[*E*] [*M*] [*P*] [*S*] [*V*] [*W*]

—or—

**XCOPY** *a* [*pathfilename*] *ext* [*b*] [*pathfilename*] *ext*] [*A*]

[*E*] [*M*] [*P*] [*S*] [*V*] [*W*]

[*e*] [*pathfilename*] *ext* source

[*b*] [*pathfilename*] *ext* target

A copy only if archive bit set

D mm-dd-yy — copy if date same or later

E — create subdirectories on target even if they end up empty

M copy modified files and reset archive bit

P prompt before copying each

S copy files in subdirectories and create on target

V verify

W wait for source disk

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# CAPTURE YOUR OWN HELP SCREENS



*CAPTURE instantly turns custom help menus, tables, or anything you type on your screen into files you can pop up with the HELP.COM program in this issue's PC Lab Notes.*

A properly designed pop-up help facility can save both time and frustration every time you use an application program. If, however, your favorite program doesn't provide on-line help, or its help screens don't meet your particular needs, the HELP program presented in this issue's PC Lab Notes is the answer to your problem. HELP lets you pop up customized help screens of your own design, either from within an application or at the DOS prompt. You decide just how many or how few pages you'll need to have on hotkey call. And if you like, you can even build a whole library of customized help screens to cover every application you (or fellow workers) use.

In order for HELP to display your individualized help files, however, each of those files must consist of a direct image of the video buffer, which can be instantly popped up on the screen. Since the files required by HELP contain binary data, creating your own from scratch would be a tedious job. CAPTURE.COM makes it a snap. CAPTURE takes whatever text you've put on the screen—a program menu, spreadsheet, or set of instructions you've created on your word processor—and turns it into an instant HELP file. Since these files contain both ASCII characters and display attributes, your help screens can be in full living color.

You can then combine these screens to form a library that can be used by the HELP program. And the PAINT utility, to be presented in the next issue, will give you a screen editor for the characters and colors in your HELP files. With this arma-

da, you'll be able to pop up any kind of help, anytime you need it.

**GETTING A COPY OF CAPTURE.** The easiest way to get a copy of CAPTURE.COM is to download it from the PC Magazine Interactive Reader Service, as explained in the accompanying sidebar. In addition, both the assembly language source code (CAPTURE.ASM) and a BASIC program (CAPTURE.BAS) that will turn itself into CAPTURE.COM when you run it are listed elsewhere in this article and are also available from PC-IRS.

CAPTURE.COM is a resident program and therefore needs to be loaded permanently into memory before it can be used. The program needs no parameters, so simply entering CAPTURE at the DOS prompt is all it takes. [*Since you're not likely to need to create help screens every day, it probably doesn't make sense to make CAPTURE a line in your AUTOEXEC-*

*.BAT file.—Ed.*] Once it is installed, you activate the program by pressing Alt-C (you can change this default hotkey combination, as explained below). CAPTURE then reads the entire screen contents and produces a file in the current directory called SCREEN.000. With each additional help file you create, the extension is incremented by one. The program is smart enough not to write over existing files: if SCREEN.001 already exists, the next screen you CAPTURE will be SCREEN.002, and so on.

Each CAPTURED file is always exactly 4,000 bytes long and contains everything needed to be used with HELP. If your display size is other than the conventional 25 by 80 characters, CAPTURE will make the necessary adjustment automatically. If you're using the 40-column mode, for example, the other 40 columns are inserted as blanks. If you have an EGA and are using more than 80 columns, the additional columns are ignored. Similarly, any rows past 25 are not included. The result is always a file just the right size for a HELP display.

Once you've created a series of help files, you'll want to combine them into a single library. The DOS COPY command is all you need. As many as 14 screens can be kept in a single file for use by HELP. Since the files contain non-ASCII data you'll have to use the binary switch. For example, to combine all your screen files, just type

```
COPY /B SCREEN.* HELP.HEP
```

This combines all your files according to the order they appear in the directory list-

■ If you like, you can build a whole library of customized help screens to cover every application you (or your fellow workers) use.

## ■ UTILITIES

ing. If you want to change the order, you'll have to specify each file individually, such as with this command:

```
COPY /B SCREEN.001+SCREEN.002+SCREEN.000 HELP.HEP
```

If you later decide to add another screen to an existing help library, use the following command:

```
COPY /B HELP.LIB+SCREEN.006
```

The /B in each command tells DOS to copy the entire file, regardless of any end-of-file characters it may contain. Every other byte of these files is a display attribute. If the color happens to be green on a cyan background, the attribute is 1Ah, the same character that normally marks the end of a pure-ASCII file.

You can easily change the default hotkey combination if Alt-C interferes with another program you're using. If you have the assembler listing, just modify the equates for SHIFT-MASK and HOT-KEY. (When you reassemble the program, don't forget to use EXE2BIN to convert it to the .COM format.) If you're using the .COM version already or you don't have an assembler, you'll have to use DEBUG to make the changes by entering the following commands:

```
DEBUG CAPTURE.COM
E 268 SS ;Your scan code
E 27D MM ;Your shift mask
W
Q
```

The tables "SHIFT-MASK Value Table" and "Keyboard Scan Codes for Alternative Hotkeys" give the possible values for the shift mask (SS) and scan code (MM) to implement an alternate hotkey. As always, when using DEBUG to make changes, be sure to keep a copy of the original in case something goes wrong.

**HOW IT WORKS** CAPTURE.COM can be broken down into three major sections: an initialization procedure to make the program resident, a routine to read the screen contents into a buffer, and a procedure to write the file to the disk.

The initialization procedure is run only when the program is initially loaded, and to reduce the memory requirement, it is not kept resident. Its main job is to modify the interrupt vector table so that interrupts

09h, 13h, 16h, and 21h are redirected to CAPTURE's own routines. The interrupt vector table is located in the lowest 1K of memory and contains pointers to critical procedures used by the processor. Four bytes are needed for each pointer: two for the segment address and two for the offset. Redirecting selected vectors is what gives resident programs the ability to monitor the keyboard or any other internal operation. CAPTURE needs the keyboard vector (INT 09h) to watch for its hotkey. It uses the other interrupts to monitor the computer's internal operations. You'll see why this is so important shortly.

Normally, when an interrupt vector is

**SHIFT-MASK Value Table**

| SHIFT-MASK Value | Shift key<br>(● = Pressed) |      |            |             |
|------------------|----------------------------|------|------------|-------------|
|                  | Alt                        | Ctrl | Left Shift | Right Shift |
| 0                |                            |      |            |             |
| 1                |                            |      |            | ●           |
| 2                |                            |      | ●          |             |
| 3                |                            |      | ●          | ●           |
| 4                |                            | ●    |            |             |
| 5                |                            | ●    |            | ●           |
| 6                |                            |      | ●          |             |
| 7                |                            | ●    | ●          | ●           |
| 8                | ●                          |      |            |             |
| 9                | ●                          |      |            | ●           |
| A                | ●                          |      | ●          |             |
| B                | ●                          |      | ●          | ●           |
| C                | ●                          | ●    |            |             |
| D                | ●                          | ●    |            | ●           |
| E                | ●                          | ●    | ●          |             |
| F                | ●                          | ●    | ●          | ●           |

intercepted, the original vector is stored so the resident program can subsequently jump to the address contained in the old vector. This technique allows the resident program to be transparent to the rest of the system. CAPTURE does this for all interrupts except when the hotkey is detected. CAPTURE discards the hotkey by making a direct return from the interrupt rather than a jump to the original keyboard routine.

Another task of the initialization routine is to make a quick search for a previously installed copy of itself. Loading multiple copies of the same resident program can

really clog a system. If you try to load a second copy of CAPTURE, the program will display the error message "Already Installed" and exit.

Two memory management items complete the installation. Every time a program is loaded, it is given a copy of the en-

**Keyboard Scan Codes for Alternative Hotkeys**

| Key | Scan code in hex | Key           | Scan code in hex |
|-----|------------------|---------------|------------------|
| Esc | 01               | Z             | 2C               |
| 11  | 02               | X             | 2D               |
| 12  | 03               | C             | 2E               |
| 13  | 04               | V             | 2F               |
| 14  | 05               | B             | 30               |
| 15  | 06               | N             | 31               |
| 16  | 07               | M             | 32               |
| 17  | 08               | <             | 33               |
| 18  | 09               | >             | 34               |
| 19  | 0A               | ?/            | 35               |
| 1A  | 0B               | Right Shift   | 36               |
| 1B  | 0C               | PrintSc       | 37               |
| 1C  | 0D               | All           | 38               |
| 1D  | 0E               | Spacebar      | 39               |
| 1E  | 0F               | CapsLock      | 3A               |
| 1F  | 10               | F1            | 3B               |
| 20  | 11               | F2            | 3C               |
| 21  | 12               | F3            | 3D               |
| 22  | 13               | F4            | 3E               |
| 23  | 14               | F5            | 3F               |
| 24  | 15               | F6            | 40               |
| 25  | 16               | F7            | 41               |
| 26  | 17               | F8            | 42               |
| 27  | 18               | F9            | 43               |
| 28  | 19               | F10           | 44               |
| 29  | 1A               | NumLock       | 45               |
| 2A  | 1B               | ScrollLock    | 46               |
| 2B  | 1C               | 7 Home        | 47               |
| 2C  | 1D               | 8 Up Arrow    | 48               |
| 2D  | 1E               | 9 PgUp        | 49               |
| 2E  | 1F               | 4 Left Arrow  | 4B               |
| 2F  | 20               | 5             | 4C               |
| 30  | 21               | 6 Right Arrow | 4D               |
| 31  | 22               | +             | 4E               |
| 32  | 23               | 1 End         | 4F               |
| 33  | 24               | 2 Down Arrow  | 50               |
| 34  | 25               | 3 PgDn        | 51               |
| 35  | 26               | 0 Ins         | 52               |
| 36  | 27               | Del           | 53               |
| 37  | 28               |               |                  |
| 38  | 29               | SysReg        | 54               |
| 39  | 2A               | F11           | 57               |
| 3A  | 2B               | F12           | 58               |

## CAPTURE BY MODEM

The programs published in *PC Magazine* can be downloaded by modem from the PC Magazine Interactive Reader Service. There is no charge for this service, but users are cautioned that these programs are copyright material and are made available only for individual, noncommercial use. You may make copies for others (including placement on noncommercial electronic bulletin boards), as long as no charge is involved. Making copies for any commercial purpose, however, is strictly prohibited.

The Eastern modem number for PC-IRS is (212) 696-0360. In the West, call (415) 598-9100. Set your modem and communications software to use 2400/1200/300 bps, 8 data bits, 1 stop bit, no parity. Files with a .COM, .EXE, or .ARC extension require use of the Xmodem error-checking protocol; files with .ASM or .BAS extensions can be downloaded using either regular ASCII or Xmodem.

If you use the Xmodem protocol, you can download CAPTURE.COM directly, saving typing or downloading either the .BAS or the .ASM version. CAPTURE.BAS, whether entered from the magazine at your keyboard or downloaded from PC-IRS, will automatically create CAPTURE.COM when run once in BASIC. CAPTURE.ASM, also listed both here and on PC-IRS, allows you to modify the program but requires a macro assembler (IBM or Micro-soft, Version 2 or later) and the following commands:

```
MASM CAPTURE;
LINK CAPTURE;
EXE2BIN CAPTURE CAPTURE.COM
```

*Photocopy this page. Trim and hole-punch the copy and add it to your DOS manual.*



Tom Kihlken

## CAPTURE Command

1988/No. 1 (Utilities)

**Purpose:** Saves the text and attribute bytes on the screen to a 4,000-byte file that the HELP.COM program (PC Lab Notes, 1988/No. 1) can pop up either from within an application or at the DOS prompt.

**Format:** CAPTURE

**Remarks:** CAPTURE is a memory-resident screen-saving program. Its default actuating key is Alt-C, though this can be changed, as described below. The program takes no parameters and saves to filenames SCREEN.000, SCREEN.001, etc. It will not overwrite existing filenames, but increments the number in the extension instead. Filenames stored by CAPTURE can then be renamed for use by HELP.COM. CAPTURE files may also be combined into multiple-page help screens (up to the 14-screen limit of HELP.COM), by using the DOS COPY /B option for copying binary files.

For example,

```
COPY /B SCREEN.000+SCREEN.001+SCREEN.002
HELP.HEP
```

would combine the first three CAPTUREd help screens into the file HELP.HEP, which might be one of the files in a \HELP subdirectory.

The Alt-C trigger key may be changed with DEBUG by entering the following commands:

```
DEBUG CAPTURE.COM
E 268 SS ;Your Scan code
E 27D MM ;Your Shift mask
W
Q
```

Tables containing the entry to make for SS (the scan code) and for MM (the shift mask) above are contained in the body of the article.

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```

INC FILENAME      PROC      NEAR      ;Set back result flags
MOV               INTI      ;Must return with interrupt's on
INC NEXT_CHAR:    RET        2      ;Return BIOS result flags

;-----
; Interrupt #9 (Keyboard) Watch for trigger key. When found, ignore
; it and execute the CAPTURE routine.
;-----
%INT999
    ASSUME DS:NOTHING, ES:NOTHING
    STI                ;Allow other interrupts
    PUSH AX            ;Must save processor state
    IN AL,60H          ;Get the scan code
    CMP AL,NOTHING     ;Is it the hot key?
    JE TRIGGER         ;If yes, check the mask
    POP AX             ;Restore the processor state
    JMP CS:OLDINT9     ;Continue with BIOS routine

;-----
; Reset the keyboard and BIOS interrupt controller
;-----
    IN AL,61H
    MOV AH,AL
    OR AL,60H
    OUT 61H,AL
    MOV AL,60H
    JMP SHORT I82
    OUT 61H,AL
    CLI
    MOV AL,20H
    OUT 20H,AL
    ;Reset interrupt controller
    STI

    CMP ACTIVE,0       ;Is CAPTURE already active?
    JNE SHORT RET      ;If active, then exit
    MOV ACTIVE,1       ;Its active now

    PUSH SI            ;Must preserve all registers
    PUSH CX
    PUSH DX
    PUSH BP
    PUSH DI
    PUSH DS
    PUSH SS
    MOV AX,8000H
    MOV SI,AX
    MOV AX,8000H
    MOV SI,AX
    ;Set points to BIOS data area
    ASSUME DS:BIOS, ES:BIOS
    CALL CAPTURE
    MOV WHIT_FILE,1
    POP SI
    POP DI
    POP BP
    POP DX
    POP CX
    POP SI
    ASSUME DS:NOTHING, ES:NOTHING
    TRST BIOS_FLAGS,011H ;Is DOS or BIOS disk busy?
    JNS SHORT RET      ;If yes, then we must wait
    CALL WRITE_TO_FILE ;Otherwise, we'll do it now

SHORT_RET:          POP AX
                    INTR      ;Back must be restored
                    ;Now were all done

%INT999            ENOP

;-----
; Interrupt 13H (BIOS diskette I/O) Set the busy flag during diskette I/O
;-----
%INT13
    ASSUME DS:NOTHING, ES:NOTHING
    PUSHF
    OR CS:BIOS_FLAGS,0100H ;Set BIOS busy bit
    POPF
    PUSHF
    CALL CS:OLDINT13
    POPF
    AND BIOS_FLAGS,1111H:011H ;Clear BIOS busy bit

;-----
; Interrupt 21H (DOS functions) Used to keep track of DOS function calls
;-----
%INT21
    ASSUME DS:NOTHING, ES:NOTHING
    PUSHF
    MOV CS:BIOS_FLAGS,0100H ;Save the flags
    OR CS:BIOS_FLAGS,0010H ;Set DOS busy bit
    OR AX,AX
    JE JUMP_TO_DOS
    CMP AX,40H
    JE JUMP_TO_DOS
    ;Save the result flags
    AND CS:BIOS_FLAGS,11111111H ;Clear DOS busy bit
    CMP CS:BIOS_FLAGS,1
    JNE NO_WRITE
    ;Anything to write?
    CALL WRITE_TO_FILE ;Safe to access disk now
    ;Recover DOS result flags
    STI
    RET 2
    ;Must return with interrupts on
    ;Return with DOS result flags

;-----
; Interrupt 24H (Critical DOS error). This interrupt is only in
; effect during a write operation. It is required to suppress the
; "Abort, Retry, Ignore" message. All fatal disk errors are ignored.
;-----
%INT24
    ASSUME DS:NOTHING, ES:NOTHING
    MOV AL,AL
    INTR ;Tells DOS to ignore the error
    ;That's all we do here

%INT24            ENOP

;-----
; This area is overwritten by the dynamic buffers.
;-----
    PC = 0
    BUFFER = 0
    PC = PC+0000H
    LASTBYTE = 0

;-----
; Here is the code used to initialize CAPTURE. It is not kept resident.
; The buffer is located here and overlays the initialization code.
;-----
    ASSUME CS:CODE, DS:CODE, ES:NOTHING
    INITIALIZE      PROC      NEAR
    MOV DX,00FFH
    MOV AX,0
    INT 21H
    ;(DOS display string service)
    ;(display title message)
    ; Search for a previously installed copy of CAPTURE

```

CAPTURE.ASM (continued)

## ■ UTILITIES

```

NEXT_SEGMENT:
MOV WORD PTR START ;modify to avoid false match
MOV AX,0000 ;start search at segment zero
MOV AX,00 ;compare to this code segment

;Look at next segment
INC CX,00
MOV AX,00
MOV AX,00 ;until reaching this code seg
JZ NOT_INSTALLED
MOV SI,OFFSET START ;setup to compare strings
MOV DI,SI
MOV CX,16 ;16 bytes must match
REP CMPSB ;Compare until to ESI:DI
OR CX,CX ;odd the strings match?
JNB NEXT_SEGMENT ;if no match, try next segment
;BX, OFFSET INSTALLED_HDD ;else, exit with error
MOV AX,0
INT 21H
MOV AX,4C01H
INT 21H

NOT_INSTALLED:
MOV AX,3509H ;Get keyboard break vector
INT 21H
MOV WORD PTR [OLDINT0],BX ;Save segment
MOV WORD PTR [OLDINT1],BX ;Save offset
MOV DX,OFFSET NEWINT0
MOV AX,2509H ;DOS function to change vector
INT 21H
MOV AX,2521H ;Get BIOS disk interrupt vector
INT 21H
MOV WORD PTR [OLDINT13],BX ;Save the segment
MOV WORD PTR [OLDINT14],BX ;Save the offset
MOV DX,OFFSET NEWINT13
MOV AX,2513H ;DOS function to change vector
INT 21H

; Allocate space for the environment.
; Leave code and space for the buffer resident.
;-----
MOV AX,00[0000] ;Get segment of environment
MOV BX,AX ;Put it into BX
MOV AX,45H ;Release allocated memory
INT 21H
MOV DX,OFFSET LASTINT0 - OFFSET CSEG + 15 ;BKR 4
MOV AX,2100H
INT 21H

INITIALIZED ENDP
CSEG ENDS
END NTANT
(CAPTURE.ASM ends)

```

```

100 REM -- BASIC PROGRAM TO CREATE capture.com
110 OPEN "capture.com" AS #1 LEN = 1
120 FIELD #1,1 AS AS
130 CHECKSUM = 0
140 FOR J = 1 TO 92
150 LINE$ = ""
155 PRINT "J="
160 FOR J = 1 TO 9
170 CHECKSUM = CHECKSUM + BYTE
180 LINE$ = LINE$ + CHECKSUM + BYTE
190 IF (J < 25) THEN LINE$ AS = CHR$(J*16)
210 PRINT #1
220 NEXT J
230 READ LINECHECK
240 IF LINECHECK <> LINE$ THEN PRINT "Error in Line":280 + 10 * J
250 NEXT J
260 CLOSE
270 IF CHECKSUM = 64885 THEN PRINT "Successful Completion!" : END
280 PRINT "COM file is not valid!" : END
290 DATA 233, 72, 2, 67, 65, 88, 84, 85, 608
300 DATA 32, 49, 32, 49, 46, 49, 32, 48, 308
310 DATA 99, 41, 32, 49, 57, 56, 55, 22, 421
320 DATA 90, 185, 182, 182, 32, 47, 111, 189, 718
330 DATA 189, 117, 118, 185, 79, 97, 116, 185, 858
340 DATA 111, 118, 115, 32, 67, 111, 13, 18, 569
350 DATA 72, 111, 116, 187, 181, 121, 32, 185, 765
360 DATA 115, 32, 45, 76, 84, 45, 67, 36, 528
370 DATA 144, 131, 189, 32, 75, 185, 184, 646
380 DATA 188, 187, 181, 118, 12, 18, 65, 188, 622
390 DATA 114, 181, 97, 188, 121, 32, 73, 116, 748
400 DATA 115, 116, 97, 188, 188, 181, 188, 36, 781
410 DATA 83, 67, 82, 69, 69, 78, 46, 48, 542
420 DATA 48, 48, 8, 8, 8, 8, 8, 8, 988
430 DATA 8, 8, 8, 8, 8, 8, 8, 8, 988
440 DATA 62, 8, 38, 255, 55, 191, 75, 3, 679
450 DATA 51, 218, 38, 58, 22, 74, 8, 124, 177
460 DATA 5, 184, 32, 7, 218, 15, 232, 15, 749
470 DATA 8, 38, 127, 23, 28, 138, 62, 98, 154
480 DATA 8, 188, 8, 285, 16, 127, 5, 71, 622
490 DATA 71, 254, 184, 128, 258, 88, 124, 218, 1219
500 DATA 254, 198, 58, 218, 128, 254, 25, 124, 1243
510 DATA 289, 232, 4, 8, 38, 143, 7, 195, 828
520 DATA 38, 128, 38, 98, 8, 58, 255, 289, 818
530 DATA 227, 128, 195, 88, 88, 198, 8, 188, 188
540 DATA 6, 123, 1, 8, 251, 88, 83, 81, 625
550 DATA 82, 85, 38, 4, 14, 31, 184, 36, 468
560 DATA 53, 128, 32, 8, 8, 8, 8, 188, 8, 188
570 DATA 3, 184, 36, 37, 232, 84, 8, 186, 762
580 DATA 96, 1, 184, 8, 41, 232, 75, 8, 649
590 DATA 114, 12, 139, 216, 188, 62, 232, 64, 1821
600 DATA 8, 232, 73, 8, 235, 232, 61, 2, 830
610 DATA 8, 117, 34, 186, 96, 1, 185, 32, 651
620 DATA 8, 188, 88, 232, 45, 8, 114, 13, 644
630 DATA 139, 216, 186, 75, 2, 185, 148, 15, 978
640 DATA 188, 84, 232, 38, 8, 188, 62, 233, 988
650 DATA 36, 37, 232, 14, 8, 7, 21, 93, 458
660 DATA 98, 89, 91, 88, 46, 198, 6, 124, 732
670 DATA 6, 195, 258, 188, 228, 98, 46, 1362
780 DATA 119, 1, 251, 195, 187, 185, 1, 254, 1113
710 DATA 7, 128, 62, 57, 126, 128, 190, 7, 598
720 DATA 48, 75, 129, 251, 182, 1, 136, 2, 724
730 DATA 232, 232, 195, 251, 88, 228, 98, 46, 1362
740 DATA 46, 116, 6, 88, 46, 255, 46, 187, 718
750 DATA 1, 38, 184, 46, 8, 142, 216, 148, 797
760 DATA 26, 36, 78, 238, 116, 35, 128, 645
770 DATA 234, 228, 97, 128, 224, 12, 128, 128, 1291
780 DATA 97, 138, 196, 235, 8, 238, 97, 258, 1243
790 DATA 124, 1, 8, 117, 238, 196, 254, 6, 123, 1, 1288
800 DATA 124, 1, 8, 117, 46, 46, 198, 8, 538
810 DATA 124, 1, 3, 82, 81, 82, 85, 87, 544
820 DATA 38, 6, 14, 31, 184, 46, 8, 142, 471
830 DATA 192, 232, 283, 254, 196, 6, 123, 1, 1288
840 DATA 1, 7, 21, 95, 93, 98, 89, 91, 497
850 DATA 46, 246, 4, 126, 1, 3, 117, 2, 348
860 DATA 232, 3, 255, 88, 187, 196, 46, 138, 1115
870 DATA 14, 124, 1, 2, 157, 156, 46, 255, 757
880 DATA 38, 111, 1, 156, 46, 128, 38, 126, 626
890 DATA 1, 251, 187, 251, 282, 3, 8, 46, 913
900 DATA 62, 123, 1, 1, 116, 5, 46, 482
910 DATA 255, 46, 115, 1, 46, 138, 62, 125, 778
920 DATA 1, 18, 116, 8, 46, 128, 62, 125, 698
930 DATA 1, 8, 117, 235, 238, 196, 254, 6, 123, 1, 1288
940 DATA 128, 14, 136, 1, 1, 235, 224, 154, 885
950 DATA 46, 138, 38, 125, 1, 46, 128, 14, 534
960 DATA 126, 1, 232, 238, 116, 35, 128, 645
970 DATA 252, 75, 116, 38, 157, 156, 46, 255, 1887
980 DATA 38, 119, 1, 156, 46, 128, 38, 126, 646
990 DATA 1, 254, 46, 128, 62, 123, 1, 1, 614
1000 DATA 197, 3, 232, 143, 294, 157, 282, 1361
1010 DATA 2, 8, 157, 46, 255, 46, 119, 1, 626
1020 DATA 188, 287, 188, 2, 1, 188, 9, 828
1030 DATA 267, 23, 247, 23, 8, 1, 51, 219, 778
1040 DATA 148, 38, 49, 195, 142, 195, 116, 114
1050 DATA 26, 198, 8, 1, 129, 254, 185, 16, 811
1060 DATA 8, 243, 164, 51, 181, 117, 235, 146, 1158
1070 DATA 1, 188, 9, 285, 33, 184, 1, 889
1080 DATA 76, 285, 33, 184, 9, 53, 285, 32, 798
1090 DATA 137, 38, 167, 1, 148, 8, 189, 1, 521
1100 DATA 188, 188, 99, 46, 188, 8, 188, 188
1110 DATA 184, 19, 53, 285, 33, 137, 38, 111, 772
1120 DATA 1, 148, 6, 113, 1, 148, 285, 2, 654
1130 DATA 187, 33, 187, 33, 187, 33, 187, 33, 717
1140 DATA 285, 33, 137, 38, 115, 1, 148, 4, 447
1150 DATA 117, 1, 148, 231, 2, 184, 22, 37, 788
1160 DATA 285, 33, 144, 33, 52, 285, 33, 137, 883
1170 DATA 38, 119, 1, 148, 6, 123, 1, 184, 684
1180 DATA 15, 3, 184, 33, 37, 285, 33, 141, 671
1190 DATA 46, 8, 142, 192, 188, 73, 285, 32, 889
1200 DATA 186, 47, 1, 184, 8, 49, 285, 33, 785

```

CAPTURE.BAS: A BASIC program that will automatically create CAPTURE.COM.



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## ■ UTILITIES

vironment. After installation, however, resident programs normally don't need this information. Therefore, CAPTURE releases the memory allocated for the environment by using function 49h of interrupt 21h. At the end of the installation, control is returned to DOS using function 31h of interrupt 21h. Terminate but Stay Resident. The number of bytes to be kept resident must be put in register DX. For CAPTURE, this is the entire code segment (except for the initialization portion itself) plus enough for the screen buffer. In all, approximately 4,850 bytes are needed.

Once CAPTURE is resident, it waits silently, examining each key that is struck. When it finds the correct combination of scan code and shift status (Alt-C by default), it jumps into action. First, it resets the keyboard and interrupt controller. This has the effect of ignoring the hotkey. Without the reset, which allows subsequent keystrokes to be acted upon, the machine will lock up. The screen contents are then read into a buffer where they wait to be written to the disk file.

**WHAT'S IN THE FILE?** The HELP program requires that each of its menu files be an exact copy of the screen image, including each character's display attribute.

Thus, the file is written in exactly the same format as the video buffer appears in memory. The first byte is the character at the first column in row 1. The second byte is its attribute. Bytes 3 and 4 are the character/attribute pair for the second column of row 1, and so on.

■ **The HELP program** requires that each of its menu files be an exact copy of the screen image, including each character's display attribute.

If the screen has 25 rows and 80 columns (the conventional size), it will take exactly 4,000 bytes to duplicate. If more rows and columns are present (as in some EGA modes), CAPTURE ignores the extra rows and columns, so that only the upper-left corner of the screen is copied. If

the 40-column mode is being used, then blanks (ASCII 32) are inserted with an attribute of 07. This is needed to enlarge the file to fit the 25 by 80 help screen.

To ensure maximum compatibility, the BIOS display function 08 of interrupt 10h is used to read the screen. This function reads the character and attribute at the current cursor position. The BIOS provides another function (0Ah) that could successfully move the cursor to each position on the entire screen, and this would allow every character/attribute to be read. Actually moving the cursor this way would create problems, however, for in order for CAPTURE to leave the screen undisturbed, the cursor would have to be replaced in its original location. Subsequently determining that actual original location is impossible when running programs that manipulate the video hardware directly.

In order to avoid this complication, then, CAPTURE simply writes the desired cursor position into the BIOS data area. The BIOS function that reads a character always uses the location found in memory anyway, so the fact that the true blinking cursor isn't actually there doesn't really matter. Saving and restoring the cursor location then obviously becomes a simple job: just push it onto the stack before be-

## SNIPPER SNAFU

Because of a printing problem, several of the DATA statements in the SNIPPER.BAS listing in the October 27, 1987 edition of the Utilities column were partially obscured. We have reprinted the affected lines in Figure A. Note that most of the lines do not follow one another as they would in the complete listing. We apologize for any inconvenience.

We have also discovered a bug in the original SNIPPER utility that may cause a problem in certain situations. If you have had problems with SNIPPER, corrected versions of the program's .ASM, .BAS, and .COM files are available from the PC Magazine Interactive Reader Service. See the sidebar "CAPTURE by Modem" for the procedure.

In addition, the Shift mask value we provided for changing SNIPPER's hot-

|           |      |      |      |      |      |      |      |      |      |
|-----------|------|------|------|------|------|------|------|------|------|
| 340 DATA  | 111, | 110, | 115, | 32,  | 67,  | 111, | 46,  | 13,  | 695  |
| 610 DATA  | 99,  | 45,  | 32,  | 81,  | 117, | 105, | 116, | 32,  | 627  |
| 620 DATA  | 186, | 200, | 205, | 205, | 205, | 205, | 205, | 205, | 1616 |
| 630 DATA  | 205, | 205, | 205, | 205, | 188, | 51,  | 219, | 139, | 1417 |
| 1370 DATA | 141, | 54,  | 193, | 1,   | 128, | 250, | 12,  | 124, | 993  |
| 1380 DATA | 10,  | 50,  | 210, | 254, | 198, | 128, | 254, | 7,   | 1111 |
| 1390 DATA | 131, | 255, | 46,  | 137, | 5,   | 71,  | 71,  | 46,  | 742  |
| 1410 DATA | 254, | 194, | 89,  | 226, | 233, | 78,  | 254, | 202, | 1530 |
| 1510 DATA | 1,   | 255, | 50,  | 192, | 232, | 7,   | 255, | 141, | 1133 |
| 1560 DATA | 46,  | 198, | 6,   | 198, | 1,   | 0,   | 80,  | 83,  | 604  |
| 1570 DATA | 81,  | 82,  | 30,  | 6,   | 14,  | 31,  | 184, | 36,  | 454  |
| 1580 DATA | 53,  | 205, | 33,  | 83,  | 6,   | 186, | 184, | 6,   | 676  |
| 1720 DATA | 168, | 8,   | 116, | 242, | 46,  | 246, | 6,   | 191, | 1023 |
| 1750 DATA | 83,  | 81,  | 82,  | 85,  | 86,  | 87,  | 38,  | 6,   | 540  |
| 1760 DATA | 14,  | 31,  | 184, | 64,  | 0,   | 142, | 192, | 232, | 859  |

Figure A: Lines from SNIPPER.BAS that did not print clearly in the October 27, 1987 issue.

key combination was incorrect. At the bottom of the mock-up DOS manual page on page 372, the last sentence should have been, "The address of the Scan code byte is :056B, and that of the Shift mask is :057B." The DEBUG

script on page 361 should have said

```
DEBUG SNIPPER.COM
E #56B SS ;Your Scan code
E #57B mm ;Your Shift mask
W
Q
—Tom Kihlken
```



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## ■ UTILITIES

ginning and later pop it back.

Reading the display contents would be a trivial task if every display had 25 rows by 80 columns. But nothing is ever so easy. The character-reading loop must not try to read positions that are beyond the screen, as a simple loop would do in the 40-column mode. To prevent this, as each character is read, a test is made to check the screen dimensions. The current number of columns on the display is found in the BIOS data area at address 0040:004A. If less than 80 columns are present (as in the 40-column mode), the missing columns are filled with spaces. Another complication arises from the possibility of having multiple pages when using a CGA or EGA. Before reading characters, then, the current page is also obtained from the BIOS data area and is passed to the read character function in register BH.

As each character and attribute is read, it is inserted into a buffer. For reasons

■ At the assembler level, everything from obtaining keyboard input to displaying output on the screen can be done by standard DOS routines.

we'll see shortly, the file may not be written immediately. Using the temporary buffer allows the ultimate file to reflect the display at precisely the time the hotkey was pressed.

The file is written using the normal techniques. To prevent deletion of any ex-

isting files, an attempt is first made to open the file. If a File Not Found error is returned, then the file doesn't exist and may safely be created. If the file is opened without error, then it already exists. In this case it is closed and the file extension is incremented by one. When a unique filename is finally found, a handle for it is obtained by creating the file. Then the entire buffer is written using DOS function 40h and the file is closed. Because these DOS calls are being made from a resident program, however, some special precautions are required.

**THE PROBLEM WITH DOS** For an assembly language programmer, DOS provides a wealth of powerful services that are unglimped by users who know DOS only through commands such as COPY, DIR, DEL, etc. At the assembler level, everything from obtaining keyboard input to displaying output on the screen can be

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## ■ UTILITIES

done by already programmed, standard DOS routines.

Above all, DOS is the supreme ruler when it comes to the formidable task of accessing disk drives. Using DOS functions doesn't only save the overworked programmer from having to rewrite these commonly used (but complex) routines for himself. At the same time it provides a device-independent means of accessing the computer's hardware. Its major benefit, however, is that it provides a way to utilize the disk drives that is consistent among all our application programs.

If this sounds great, it should. But there's always a catch. Nearly all of the DOS functions are nonreentrant. What that means is that once a function begins, it must be allowed to complete its operations before another function can begin. For a single-task operating system, this doesn't matter. But pop-up programs are actually a form of multitasking. The pop-up program

■ By their very nature, pop-up utilities can be activated at any time. In fact, it's very likely that one could pop up in the middle of an executing DOS function.

must run while the underlying application is suspended.

By their very nature, pop-up utilities can be activated at any time. In fact, it's very likely one could pop up in the middle

of an executing DOS function. When this happens, the resident program must not itself request any additional DOS functions.

Most pop-up programs sidestep this problem by not using any operating system calls. This isn't really very difficult since the PC's basic input/output system (BIOS) also provides most of the commonly needed I/O services. The BIOS is contained in read-only memory (ROM) and allows recursive calls. Accessing the disk, however, is such a complex task that the full power of DOS is needed to safely tackle it.

**THE SOLUTION** Detecting when DOS functions are in progress is done by intercepting interrupt 21h. Each time a DOS function begins, a busy flag is set. At the same time the byte DOS.STAT is set to the function number (which is found in register AH). When the function completes, the busy flag is cleared. It's simple, but very effective. The busy flag is kept in

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the bit 0 of `BUSY_FLAGS`. Thus, each time `CAPTURE` is activated, it checks the busy flag before making any DOS function calls. If it finds the busy flag set, then it must return control and wait until later to write the file. When this happens, the value of `WRITE_FILE` is set to 1 to signal the need to empty the buffer.

An additional bit of the byte `BUSY_FLAGS` (bit 1) is used to keep track of when disk accesses are being made by the BIOS. It is set and cleared each time an interrupt 13h is executed. Although this specific interrupt itself allows recursive calls, it is treated as nonreentrant. This somewhat conservative approach is used to avoid potential timing problems that could arise from interrupting a non-DOS disk access.

Each time a DOS function completes, `WRITE_FILE` is checked to see if the buffer needs to be written. If its value is 1, then `WRITE_TO_FILE` is called. Since a DOS function has just completed, we are sure it's safe to use the disk. If DOS is waiting for keyboard input (as in functions 8 and 0Ah), another approach is taken.

Although it's permissible to use the higher-numbered functions while DOS waits for keyboard input, you've got to be careful. To be compatible with other resident programs requires starting the function call only when DOS is in a stable condition. To detect these opportunities, interrupt 16h is monitored. DOS constantly executes interrupt 16h while checking for keystrokes. Each time it does, `WRITE_FILE` is checked and, if necessary, `WRITE_TO_FILE` is called. This logic ensures that the file is written as soon as possible.

Keeping close tabs on DOS is the secret to making `CAPTURE` work correctly. Coaxing the operating system to do something it wasn't designed for requires all the trickery one can muster. I think you'll find the remainder of the code quite simple and straightforward, however.

`CAPTURE`, `HELP`, and the upcoming `PAINT` program form a dynamic trio with which you can truly personalize your system. Who says that computers can't be friendly? 

Tom Kihlken is an occasional contributor to PC Magazine.

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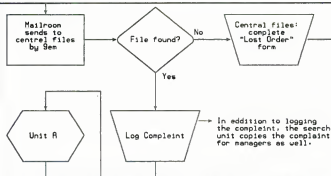
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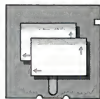
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■ ENVIRONMENTS ■ CHARLES PETZOLD

# OS/2'S MULTIPLE VIDEO ALTERNATIVES



*In theory, the OS/2 Kernel is for character mode and the Presentation Manager is for graphics, but in practice there's a way to do graphics under the Kernel and vice versa.*

In my last column I discussed the VIO interface included in the OS/2 Kernel. OS/2 programs use the VIO functions for character-mode video I/O. These functions are considerably faster than their equivalent functions in MS-DOS and the IBM PC BIOS, and they are nearly as fast as directly accessing the video memory buffer.

The VIO interface in the OS/2 Kernel is primarily intended for character mode; it has limited graphics support. Graphics support in OS/2 is instead part of the OS/2 Presentation Manager.

Ostensibly, then, programmers have a clear-cut choice between two environments under OS/2: the Kernel is for traditional character-mode programs, and the Presentation Manager is for windowed graphics programs. A program running under the Presentation Manager uses the Graphics Programming Interface (GPI) for all graphics and text output. The Presentation Manager also includes built-in facilities that allow programs to implement a consistent and easy user interface very similar to that found in Windows 2.0.

Yet this simple distinction between the Kernel (character mode) and the Presentation Manager (graphics) does not tell the whole story. Programmers can use graphics under the OS/2 Kernel, and they can even use the VIO functions under the Presentation Manager. Let's take a look at these video alternatives.

**OS/2 KERNEL AND GRAPHICS** The EGA43 program in last issue's column ("Exploring the OS/2 Video Inter-

face," *PC Magazine*, December 22, 1987) showed how to use the VioSetMode function to switch to the EGA 43-line mode. In the version of the OS/2 Kernel distributed with the OS/2 Software Development Kit, the VioSetMode function can also switch to a CGA or EGA graphics mode. Obviously, the retail version of OS/2 will include VGA support as well.

But after a program gets into a graphics mode, there is not much additional support in the Kernel to do anything with it. Unlike the PC BIOS character output functions, the OS/2 VIO functions do not translate text strings into graphics pixel patterns. When a program calls the VIO output functions while in a graphics mode, they basically write garbage to the screen.

The only real support in the OS/2 Kernel for graphics output involves the CGA graphics modes. If a program switches into a CGA graphics mode (320 by 200 with four colors or 640 by 200 with two colors),

■ If a program switches into CGA graphics mode, it can call VioGetBuf to get access to a 16K "logical buffer" where it can draw graphics.

it can call VioGetBuf to get access to a 16K "logical buffer" that corresponds to the CGA graphics memory. It can draw graphics on this buffer and then update the real screen by calling VioShowBuf.

For the EGA graphics modes, however, VioGetBuf returns an error code. The basic problem is that the logical buffer for the EGA (640 by 350 with 16 colors) would have to be about 112K. For the VGA, it would be about 160K. And for the IBM 8514 adapter board, which operates in 1024 by 768 resolution with 256 simultaneous colors, the buffer would be almost 800K.

Clearly, we're talking about huge chunks of memory here. It wouldn't be quite so bad if only one graphics program were running at any time. But the OS/2 Kernel supports multiple screen groups and would have to retain these large buffers when switching between screen groups. That simply becomes prohibitive.

But this doesn't mean you can't write an EGA or VGA graphics program that runs under the OS/2 Kernel. It's just that it's not nearly as easy as using character mode.

**HARDWARE ACCESS UNDER OS/2** In previous columns I've said that it is intolerable for individual applications to access the hardware directly under a multi-tasking operating system. This is, of course, the traditional assumption.

However, the OS/2 Kernel does not enforce this rule with rigid authoritarianism. In fact, the OS/2 Kernel includes several documented functions that do allow appli-

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cations to access the PC's hardware directly. These are designed primarily to allow programs direct access to video adapter boards.

Doing this starts out fairly simply. A program calls the `DosPortAccess` function to get access to a range of I/O ports, and it calls the `VioGetPhysBuf` function to get selectors (segment addresses) for video memory. The program can then write to the video board I/O ports and memory just as it can under the nonprotected DOS environment.

Well, not quite. One of the ways in which 80286 protected mode protects the integrity of the operating system is through four "privilege levels." Every code segment running under protected mode runs in one of these four privilege levels. The code with the highest privileges runs at level 0. In OS/2, level 0 is reserved for core Kernel functions. Most OS/2 applications run at level 3, the lowest privilege level. A code segment that accesses I/O ports must run at privilege level 2. (Level 1 is not used in OS/2.)

An OS/2 program that directly accesses machine hardware must contain at least two code segments, one running in privilege level 3 and the other running in privilege level 2. The level 3 code segment contains the bulk of the program; subroutines in the level 2 segment access the I/O ports of the video adapter board. A programmer can specify that this second segment runs in level 2 by creating a small "module definition file" that describes the attributes of the program's code segments. In this file, the level 2 segment is indicated by the keyword `IOPR` ("I/O Privilege Level"). `LINK` reads the module definition file when creating the program's .EXE file. The level 2 segment is flagged as such in the .EXE file so that OS/2 can give it proper privileges when the program is loaded into memory to run.

When a program calls a routine in a higher-privilege-level segment, the call passes through a "call gate" that changes the privilege level. (This process is transparent to the program.) These call gates allow transition only to a higher privilege level, such as a call from level 3 to a routine in level 2. The routine in level 2 can access the I/O ports and then return to the level 3 code that originally called it.

Most of the entry points to OS/2 Kernel functions are in level 3 code segments. Thus, the OS/2 Kernel functions can be called only from a code segment also running in level 3. This has a very simple implication: If a program has a code segment running in level 2, that code segment cannot make any calls to OS/2 Kernel functions. All calls to OS/2 Kernel functions must be from the program's other code segment, which is running in level 3.

**SCREEN GROUP SWITCHES** So far, these requirements are not particularly onerous. The programmer divides the program's code into two more segments. The level 3 segment makes calls to the OS/2

## ■ The OS/2 Kernel includes several functions that do allow applications to access the PC's hardware directly.

functions `VioSetMode` to switch to a graphics mode, and `DosPortAccess` and `DosGetPhysBuf` to get access to the video adapter board hardware and memory. The level 3 segment then calls routines in level 2 to access the video adapter and do the graphics output.

But here's the problem: The OS/2 Kernel supports multiple screen groups. OS/2 must be able to switch away from the screen group running the graphics program. This could happen for several reasons: The user could switch to another screen group by pressing the Alt and Esc keys. A program running in the background may want to gain control of the screen by calling the `VioPopUp` function. OS/2 itself might need to use `VioPopUp` to report a critical error of the "abort, retry, ignore" variety.

When switching away from a screen group, OS/2 has to save the current state of the video adapter board and the contents of video memory. It has to restore these when switching back to the screen group. Nor-

mally, this is simple. The screen groups running in character mode use only a few kilobytes of video memory. OS/2 knows the state of the video adapter board because all changes to it have gone through the OS/2 VIO functions.

But when a program is directly accessing the video display hardware, this job becomes insuperable. In general, OS/2 cannot save the state of the video adapter board because most registers on the EGA are write-only. (Registers on the PS/2 VGA board are read-write, so that's a help.) OS/2 would also have to save the entire contents of video memory. For the EGA and VGA, this is 256K. After switching away from the screen group containing the graphics program, the program cannot be allowed to write to the screen because it would interfere with other programs. The program itself would have to be suspended, and for some applications this is simply not tolerable.

So, rather than attempt to do all this, the OS/2 Kernel shifts all this responsibility to the program itself. The program must save its own video state during screen group switches.

**HANGING BY A THREAD** Here's where it gets hairy. A program that directly accesses video hardware must start up two additional "threads" of execution. (Threads are routines in the program that run simultaneously with the rest of the program.) One of these threads calls the `VioModeWait` function; the other calls `VioSaveRedrawWait`. These functions serve to notify the program when a screen group switch is about to occur. When the graphics program wants to write to the screen, it calls `VioScrLock` to temporarily prevent screen group switches and `VioScrUnlock` to again allow screen group switches.

The key here is that the program is notified of imminent screen group switches when a thread returns from the `VioModeWait` or `VioSaveRedrawWait` functions. The program itself can then save the current video state and the contents of the video memory buffer. OS/2 can then switch away from the screen group without saving any part of the video memory.

If the program is running in the background and attempts to call `VioScrLock` to write to the screen, then `VioScrLock` can

either return immediately with an error or not return at all until the program is once again running in the foreground. (The program specifies which of these two options is preferable.) This prevents the program from accessing the display when the program is running in the background.

Forcing the program to take the responsibility for saving the video state and memory during screen group switches has advantages. In most cases, the program knows best how to re-create the video display when the screen group is restored. For example, the program may be displaying a simple bar graph. The program has all the data it needs to re-create this graph. It's probably just a few numbers. In such a case, the program doesn't need to save the contents of the video display buffer at all; it can re-create the screen by redrawing the bar graph from stored data.

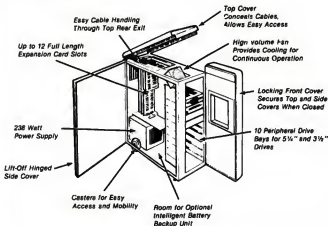
All this stuff with multiple threads might sound incredibly complex (and it is), but the code involved is likely to be insignificant in comparison with everything else a program needs to do EGA and VGA graphics. Think of it this way: Normally, a multitasking operating system would not allow programs to directly access hardware. OS/2 allows it. This complexity is the price you pay.

But the real alternative to this complexity is to avoid doing graphics under the OS/2 Kernel at all. A program that needs to use graphics is better off taking advantage of the extensive graphics support built into the OS/2 Presentation Manager.

**PRESENTATION MANAGER** As of this writing (late September), only the specifications of the Presentation Manager have been distributed as part of the OS/2 Software Development Kit. Judging from the specifications (and other public information), the Presentation Manager is a graphical windowing environment that is capable of running multiple programs. It has a look and feel very much like *Microsoft Windows 2.0*.

The Presentation Manager is composed of two major parts: a set of functions that give a program access to the various elements of the user interface (windows, menus, dialog boxes, scroll bars, etc.), and the Graphics Programming Interface (GPI).

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## ■ ENVIRONMENTS

## Video Output Alternatives Under OS/2

| Environment                              | Video output                  |                                  |
|------------------------------------------|-------------------------------|----------------------------------|
|                                          | Character mode                | Graphics                         |
| OS/2 Kernel<br>OS/2 Presentation Manager | VIO functions<br>Advanced VIO | Access hardware<br>GPI functions |

GPI is hot stuff. It is derived in large part from IBM's mainframe Graphical Data Display Manager (GDDM) and is consequently much more sophisticated than any currently available microcomputer graphics system.

GPI is a device-independent graphics interface. A Presentation Manager application does not need to have its own drivers for each type of video board. GPI handles all that. GPI implements a system of "stored graphics" that allows a program to construct a graphics image out of a series of saved pieces.

After an image is displayed, GPI has an automatic "hit-testing" mechanism that allows a program to determine which graphics primitive that the user is pointing at with the mouse. The GPI drawing functions excel particularly in curved lines, including several ellipse functions, a spline function, and facilities to produce parabolic, hyperbolic, and elliptical interpolations between points.

GPI is part of the Presentation Manager. A program that wants to use GPI must run under the Presentation Manager and use the various windowing and user interface functions. The structure of a Presentation Manager program (like that of a *Windows* program) is based on a message-passing architecture. For programmers whose previous experience is limited to traditional operating systems (such as MS-DOS and the OS/2 Kernel), there's a steep learning curve ahead.

Some people find that the messaging architecture of *Windows* and the Presentation Manager is an enormous improvement over the structure of traditional programs. For them, the graphics are icing on the cake. To other programmers, however, the messaging, windowing, and user interface aspects of *Windows* and the Presentation Manager are a curse that has to be

endured in order to use the graphics.

Because the OS/2 Presentation Manager runs in a graphics mode, it becomes responsible for dealing with the screen group switching problems that I discussed above. In theory, the Presentation Manager doesn't have to save the contents of video memory when the user switches away from the Presentation Manager screen group. The Presentation Manager can restore the screen by sending "repaint" messages to all of the individual programs

## ■ By any standard, a marriage between IBM and Microsoft is likely to produce mutant offspring.

running under it so they update their own respective areas of the screen.

### ADVANCED VIO: TOPVIEW LIVES?

From the programmer's perspective, one problem with *Windows* and with the Presentation Manager is that all screen output uses graphics functions. Even if a program needs to display only simple monospaced text, the program must calculate line spacing increments to position the text correctly on the screen. Text output in a *Windows* or Presentation Manager program is generally a lot more complex than text output from an OS/2 Kernel program.

However, the OS/2 Presentation Manager has an alternative to graphics text output. It's called "Advanced VIO," and it allows a Presentation Manager program to use the OS/2 Kernel VIO functions (discussed in last issue's *Environments* col-

umn) for producing text output.

When using Advanced VIO, the program requests a "presentation page" that contains a specific number of character rows and columns. This is a virtual screen and could be much larger than the actual screen. The program writes on this presentation page using the normal VIO functions. The program then specifies a row and column coordinate that the Presentation Manager uses to display a portion of this virtual screen within the program's window.

This concept might sound familiar. In fact, it is very similar to the video output interface in IBM's *TopView*. I thought that *TopView* died a long time ago during the "window wars," so I was particularly surprised to find the concept reborn in the Presentation Manager.

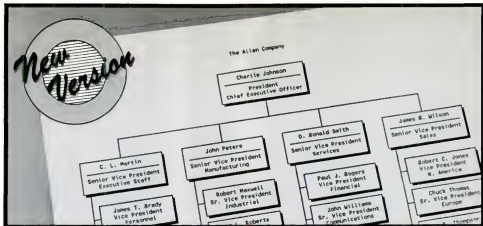
Advanced VIO reminds us again that the OS/2 Presentation Manager is a product of the IBM/Microsoft Joint Development Agreement. By any standard, a marriage between IBM and Microsoft has to be a strange one and is likely to produce some mutant offspring. Advanced VIO—half OS/2 Kernel, half *TopView*—is without a doubt the oddest part of the Presentation Manager.

A summary is presented in the table "Video Output Alternatives Under OS/2." Bear in mind that the Presentation Manager always runs in a graphics mode. The text output from an Advanced VIO program is converted to graphics before being displayed on the screen. Advanced VIO simply gives a program a more convenient environment in which to output text.

### CHARACTER-MODE WINDOWING

In the months and weeks preceding the April 2 announcement of OS/2 by IBM and Microsoft, rumors were flying about the new operating system. The most persistent rumor was that OS/2 would include a "character-mode version of *Windows*." Just days before the official announcement, people I trust told me this was the truth. Some people apparently had actually seen the thing in operation. It looked like *Windows*, they said, but it ran in character mode.

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## ■ ENVIRONMENTS

tation Manager, which has a graphical interface.

But on April 2 the Presentation Manager was far from ready for an actual demonstration. Instead, IBM showed off a silly-looking demo program that was supposed to simulate the operation of the real product. This mock-up did run in character mode and looked like an ugly clone of Windows 2.0. Perhaps this demo was for the benefit of those people who had been asleep for the past 2½ years and didn't know what Windows was. The demo let them poke at the screen with a mouse and see a menu drop down.

So people really had seen a character-mode version of the Presentation Manager before April 2. They just didn't know they were looking at a phony demo.

The rumors about a character-mode windowing system for OS/2 refuse to die. Is there a possibility that OS/2 might someday run such a thing? Surely Advanced VIO leaves a door open for it. Any Presentation Manager program that uses only Advanced VIO for screen output could run without any change in a character-mode

■ The rumors about a character-mode windowing system for OS/2 refuse to die.

windowing system.

The single significant advantage of character mode is raw speed. Nothing else commends it. Character-mode screens make inefficient use of space and have a much lower information density than graphics screens. Using a mouse is awful in character mode because the pointer skips around in character cell increments, and character mode is particularly ugly when windowing and color are involved.

Still, there's nothing to prevent a software manufacturer—not necessarily IBM or Microsoft—from developing a character-mode windowing system that runs under the OS/2 Kernel. Some people see a real need for it. We'll see.

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# EXAMINING THE MS-DOS ENVIRONMENT



*Accessing strings in the environment block is easy in C and messy in assembler, but you'll see why and how to do it with the programs presented here.*

To many MS-DOS users and programmers, the *environment* block is a mystery wrapped inside an enigma. The enigma is why it exists and what it is good for. The mystery is how to get at or change the information in the environment once you can think of something you can do with it.

In this issue, I'll discuss the structure of the environment, its assets and limitations, and the tools provided by C to access the environment. Finally, I'll present a general MASM subroutine you can use in your own programs to extract a string from the environment.

**HISTORICAL BACKGROUND** To understand why the environment exists, you must hark back to the Dark Ages of computing, when CPUs were expensive, terminals were relatively cheap, there were giants in the land, and UNIX was considered state-of-the-art system software. When a new user is assigned a password on a UNIX system, a "profile" file is created for that person that defines his type of terminal, his preferred "shell" or command processor, the name of his "home" directory, and other such stuff. This file is just a plain ASCII text file and can be edited by the user or system manager at any time.

When the user logs in, UNIX automatically locates his profile file, starts up a new copy of the shell and attaches it to his terminal, and then creates a block of memory for that user called the environment. The environment contains one or more strings, called environment variables, of the form

## name=parameter

These strings are derived from the contents of the profile file. Programs run by the user can inspect the strings in the environment to determine what command line options to use as defaults or how to control the terminal. For example, the environment might contain a string of the form

## TERM=VT52

This would indicate that the user's terminal is a DEC VT52 CRT, a fairly ancient piece of equipment. A general-purpose text editor can search for this string in the environment and then look up VT52 in an internal table that tells it which escape sequence to use to clear the screen or to position the cursor.

Thus, the *environment* stems from the concept of an in-memory block of information that (1) might be completely different for each user currently logged onto the system, and that (2) defines each user's

preferences and working conditions. By editing his profile file or using other commands to change or add strings to the environment, the user can customize the behavior of the various utility programs to make his work easier and accommodate the special needs of his particular terminal.

**MS-DOS ENVIRONMENTS** MS-DOS environments are conceptually derived directly from UNIX environments. In MS-DOS, an environment is a block of memory containing one or more environment variables, each consisting of an ASCII string terminated with a zero byte. Such a string is sometimes called an ASCII string. As in UNIX, each environment variable takes the form

## name=parameter

The environment block is always aligned on a paragraph boundary (that is, its beginning memory address is always evenly divisible by 16), and it may be as large as 32KB. The entire set of ASCII strings is terminated with an additional null byte.

The original, or master, environment for the system is owned by the command interpreter that is loaded when the system is turned on or restarted (usually COMMAND.COM). Strings are placed into the system's master environment block by COMMAND.COM as a result of PATH, SHELL (COMSPEC), PROMPT, and SET commands, with default values always present for the first two.

For example, if an MS-DOS 3.2 system is booted from drive C:, and if there is

■ To understand why the environment exists, you must hark back to the Dark Ages of computing, when UNIX was state-of-the-art software.

## ■ POWER PROGRAMMING

neither a PATH command present in the AUTOEXEC.BAT file nor a SHELL command in the CONFIG.SYS file, COMMAND.COM's environment will contain the two strings

```
PATH=
COMSPEC=C:\COMMAND.COM
```

These are used by COMMAND.COM to search for executable "external" commands and to find its executable file on the disk so that it can reload its transient portion when necessary. When the PROMPT string is present (as a result of a previous PROMPT or SET PROMPT= command), COMMAND.COM uses it to tailor the prompt displayed to the user.

Other strings in the environment are used only for informational purposes by transient programs and do not affect the operation of the MS-DOS operating system proper. For example, the Microsoft C Compiler and Linker look in the environment for LIB, INCLUDE, and TMP strings that tell them where to find C header files and object module libraries and where to build temporary working files. You can display the current contents of COMMAND.COM's environment block at any time just by entering a SET command without any parameters.

The more difficult aspects of the environment arise from the fact that every program has its own copy. When one program (the parent) uses the MS-DOS EXEC function to launch another program (the child), it must provide, as one of the parameters, a pointer to an environment block. If the parent provides a zero pointer, the child simply receives an exact copy of the parent's environment block. Alternatively, the parent can provide a pointer to an expanded, altered, or empty block of ASCII strings.

Any changes made by the child program to its environment block are visible to its own children but simply vanish when it exits. A child program cannot affect the environment of its parent, since it has no way to know the address of that environment block. This is called *scoping* and it explains why, for example, EXECing a secondary copy of COMMAND.COM to execute SET, PROMPT, or PATH commands is a fruitless enterprise.

The environment block owned by each

program is also static once it is created. This has important implications for TSR programs that use environment variables, since their environment blocks will not be updated if the user enters SET, PATH, or PROMPT commands after the TSR is loaded.

In spite of its limitations, you can take advantage of SET commands and the environment to make your program more flexi-

■ Any changes made by the child program to its environment block are visible to its own children but simply vanish when it exits. It cannot affect the environment of its parent.

ble and convenient to use. One of the enhancements introduced in Microsoft MASM 5.0 provides a good example. MASM 5.0 allows you to SET a MASM= string in the environment that contains the default switches you wish to use for each program assembly. For example, if you place the command

```
SET MASM=/L /Zi /T
```

in your AUTOEXEC.BAT file, MASM

5.0 will automatically use its "terse" message mode, generate a listing, and include symbolic debugging information in the resulting object file each time you invoke it.

**C AND THE ENVIRONMENT** Knowing that the histories of the C language and UNIX are closely intertwined, you might surmise that C provides ways to extract strings from a program's environment block. You'd be right. A C program can either receive environment information passively or can obtain it actively by calling a library function.

In the last column, I discussed how the C startup module passes two parameters related to the command line to the main routine of a C program. These are *argc*, the number of arguments in the command line, and *argv[]*, an array of pointers to the individual arguments. The C program startup code also provides *main* with a third parameter, *envp*, which is an array of pointers to the ASCII strings in the program's environment. The last address in the array points to a null string, i.e., a string consisting only of a zero byte.

The program can make use of the *envp* pointer or simply ignore it. Most programmers don't even bother to declare it as a formal parameter for *main*, since there are simpler ways (which I'll discuss in a minute) to get specific information out of the environment than by inspecting every string in it.

A brief program that demonstrates the use of the *envp* parameter, called DUMPENV.C, is shown in Figure 1. It loops across the *envp* pointer array, displaying

```
#include <stdio.h>

main(argc,argv,envp)
int argc;
char *argv[];
char *envp[];
{
    int i=0; /* index to envp pointer array */
    while (*envp[i] != NULL) /* loop until NULL string found */
    { /* display envp index and environment variable */
        printf("\nenvp[%d]: %s", i, envp[i]);
        i++; /* bump index to envp */
    }
}
```

Figure 1: DUMPENV.C, a simple demonstration of the use of *envp* to display all environment variables.

```

#include <stdio.h>

main(argc,argv)
int argc;
char *argv[];
{
    char buffer[80];          /* keyboard input buffer */
    char *p;                  /* pointer returned by getenv */

    while(1)
    {
        printf("\nEnter name: ");
        gets(buffer);         /* input env. variable name */
        if(buffer[0]==NULL) break; /* exit if nothing entered */
        strupr(buffer);        /* fold input to upper case */
        p=getenv(buffer);      /* search for env. variable */
        if(p == NULL) p="not found";
        printf("\nThe value is: %s",p);
    }
}

```

Figure 2: SHOWENV.C, a demonstration of the use of `getenv`. The program prompts the user to enter the name of an environment variable, then displays its value.

the array index and the associated pointer's string until it detects a null string.

Most C programmers prefer to use the standard C library function `getenv`, which searches the environment for a specific variable. It is called with a pointer to the name of an environment variable, and it returns a pointer to the parameter associated with the name—the part of the environment variable following the equals (=) character. If the name is not found, the

function returns a pointer to a null string.

Figure 2 contains a small program, SHOWENV.C, that illustrates the use of the `getenv` library function. SHOWENV prompts the user to enter the name of an environment variable, then displays the parameter associated with that name or the message "not found" if the environment variable does not exist. The program exits when the user presses Enter alone in response to the prompt, or enters a Ctrl-C.

## MASM AND THE ENVIRONMENT

From a MASM programmer's point of view, extracting information from the environment block is an unpleasant and messy process. First, MS-DOS provides each program with a pointer to its copy of the environment block in the form of a segment address at offset 002CH in the pro-

■ From a MASM programmer's point of view, extracting information from the environment block is an unpleasant and messy process.

gram segment prefix (PSP). The .COM files have no problem locating the PSP since they are loaded with all segment registers pointing to it. Access to the PSP is inconvenient at best for .EXE programs. They are loaded with DS and ES pointing to the PSP, but usually must change those

|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |
|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <pre> name    getenv page    55,132 title    GETENV get environment string  ; (C) 1987 Biff Communications Co., by Ray Duncan ; Call with: DS:SI = ASCII env. variable name ;            SI = segment of environment ; Returns:   SI:DI = address of env. variable ;            AX = length (0 = not found) ; _TEXT    segment word public 'CODE'         assume cs:_TEXT         public  getenv ; make visible to linker getenv  proc    near ; return address and length ; of environment variable         push    si         push    ax ; save registers         mov     si,0000h ; assume max env. = 12 KB         mov     di,di ; initial env. offset         xor     ax,ax ; default length result  get1:   cmp     byte ptr es:[di],0         je      get4 </pre> | <pre>         pop     si         push    si ; initialize address of target ; variable to be found          repne  cmq     ptr [si-1],0 ; compare target and env. strings         jne     get2 ; jump if incomplete match         cmp     byte ptr es:[di-1],0         je      get3 ; jump if match was complete  get2:   repne  scasb     ptr [di-1],0 ; scan for end of env. string         jmp     get1 ; and try again to match  get3:   push    di         repne  scasb     ptr [di-1],0 ; save address after - si: ; look for end of this string         pop     ax         xchg    di,ax         dec     ax,di         dec     ax ; don't include null byte  get4:   pop     si         pop     cx ; common exit point ; restore registers         ret ; return to caller  getenv  endp  _TEXT  ends end </pre> |
|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|

Figure 3: The module GETENV.ASM, which returns the address and length of the variable portion of the environment string.

## ■ POWER PROGRAMMING

|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |
|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <pre> name          shownv page          55,132 title         SHOWENV -- getenv demo  ; (C) 1987 Kiff Communications Co., by Ray Duncan  stdin equ     \$           ; MS-DOS handles for stdout equ    1           ; standard devices stderr equ    2  cr equ        0dh         ; ASCII carriage return lf equ        0ah         ; ASCII line feed blank equ     020h        ; ASCII blank tab equ       09h         ; ASCII tab  extern         getenv:near ; returns address of env. string  DGROUP group  _DATA,STACK  _TEXT segment word public 'CODE'  assume cs:_TEXT,ds:DGROUP,ss:STACK  main proc     far         ; entry point from MS-DOS mov          ea,es:[2ch]   ; get environment segment  main1: ; get env. variable to ; search for...  mov          cx,DGROUP    ; make our data segment mov          ds,cx        ; addressable  mov          dx,offset msg1 ; display cue to user mov          cx,msg1_len   ; 'Enter name: ' mov          bx,stdout     ; ah,40h mov          ah,40h int          21h  mov          dx,offset inbuf ; input name of environment mov          cx,inbuf_len   ; variable from user mov          bx,stdin      ; eh,3fh mov          ah,3fh int          21h  sub          ax,2          ; remove cr-if characters or           ax,ax        ; anything entered? je           main3         ; no, exit  mov          bx,ax         ; append null to string mov          byte ptr [bx+inbuf],0  mov          dx,offset msg2 ; print message mov          cx,msg2_len   ; 'The value is: ' mov          bx,stdout     ; ah,40h mov          ah,40h int          21h  mov          si,offset inbuf ; address of ASCII string call        strupr         ; fold to upper case call        getenv        ; search environment  or           ax,ax        ; find anything? je           main2         ; no, display error message  push        ax            ; display value of pop          ds            ; environment string  mov          dx,di mov          cx,ax mov          bx,stdout mov          ah,40h int          21h jmp         main1         ; go ask for another </pre> | <pre> main2: mov          dx,offset msg3 ; env. variable not found, mov          cx,msg3_len   ; display error message mov          bx,stdout     ; ah,40h mov          ah,40h int          21h jmp         main1         ; go look for another  main3: mov          ax,4c00h      ; exit to MS-DOS int          21h  main     endp  pmmsg proc near           ; print message on stdout ; DS:DX=message, CX=length  mov          bx,stdout mov          ah,40h int          21h ret  pmmsg   endp  strupr proc near         ; convert ASCII string to ; upper case ; cell with DS:SI = string ; save string address  push        si  strup1: lodsb            ; next character or          al,al         ; found end (null byte)? je          strup2        ; yes, jump cmp         al,'a'        ; test if in range 'a'-'z' jbe         strup1        ; skip it if not &gt;= a je          strup1        ; skip it if not &lt;= z sub         byte ptr [si-1],0-'A' ; change char to lower case jmp         strup1        ; get another char  strup2: pop              si ; restore original string ret                    ; address and return  strupr endp  _TEXT   ends  _DATA  segment word public 'DATA'  msg1 db      cr,lf,'Enter name: ' msg1_len equ \$-msg1  msg2 db      cr,lf,'The value is: ' msg2_len equ \$-msg2  msg3 db      'not found!' msg3_len equ \$-msg3  inbuf db      64 dup (0) ; keyboard input buffer inbuf_len equ \$-inbuf  _DATA  ends  STACK segment para stack 'STACK'  dw      64 dup (?)  STACK ends  end     main </pre> |
|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|

Figure 4: The program *SHOWENV.ASM*, which demonstrates the use of the *GETENV* routine shown in Figure 3.

registers to access their data. This requires the address to be saved locally. Programs running under DOS 3.0 and later can use DOS Int 21h function 62h to receive the PSP of the currently executing process. (Yet another reason to upgrade.)

And second, while ASCIIZ strings are just fine for C programs, where the support for them is designed in, they are very painful to manipulate in MASM programs. Whenever a program wants to copy or alter an ASCIIZ string, it first has to scan the en-

tire string for a null byte in order to determine the length of the string.

In Figure 3 I have provided a subroutine called *GETENV* that is exactly analogous to the C function *getenv*. It is called with the segment of the environment block in

## ■ POWER PROGRAMMING

■ The GETENV routine can be separately assembled and linked into your other MASM programs whenever it is needed, just like the `argv` and `argc` routines.

register ES and the address of the name of an environment variable in registers DS:SI. It returns the address and length of the parameter associated with that name in registers ES:DI and AX, respectively, or a zero in AX if the environment variable is not found. This routine can be separately assembled and then linked into your other MASM programs whenever it is needed, just like the `argv` and `argc` routines in the previous column.

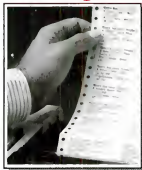
Figure 4 contains a short MASM program, called SHOWENV.ASM, which operates just the same as SHOWENV.C and demonstrates the use of the GETENV subroutine. It prompts the user for a name, calls GETENV to search the environment, and then displays either the resulting parameter or an error message. The program may be terminated by just pressing the Enter key at the prompt, or, again, by entering Ctrl-C.

In order to assemble the GETENV.ASM and SHOWENV.ASM modules and link them into the executable program SHOWENV.EXE, simply use the following commands:

```
C>MASM GETENV;
C>MASM SHOWENV;
C>LINK SHOWENV+GETENV;
```

In the next Environments column, we will take a look at C and MASM methods for adding or changing the environment variables while a program is running (as opposed to using the SET command at the MS-DOS prompt).

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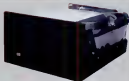
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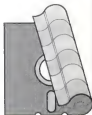
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■ JARED TAYLOR

# SPREADSHEET CLINIC



*A bug in zero suppression in 1-2-3; printing spreadsheets with patterns and shades using an HP LaserJet Plus; formulas that let you refer to relative cell addresses.*

## RELATIVE CELLS IN MACROS

Anyone who used to work with a main-frame program called *Foresight* and has since moved to 1-2-3 misses the ability to refer to a relative cell address in a macro. In *Foresight*, for example, you could write a macro to do something in a cell three columns to the right or two rows up from the cursor. In 1-2-3 or *Symphony*, while you can do this in a macro, it's cumbersome. You have to move the cursor with [down 4], for example, which takes time. It's especially time-consuming if you find that you have to move the cursor out of the current window.

With Release 2.0 of 1-2-3, however, you can write a concatenated string formula using the (a cellpointer function to produce relative cell addressing. The first formula in Figure 1 appears in the spreadsheet as the macro command {goto}D11-, if the cursor is in cell B11. It simply moves the cursor two cells to the right of wherever it is when the macro runs.

The second long formula results in a macro command that enters the label Hello! in the cell to the left of the cursor. In each case, the relationship of the referenced cell to the cursor is established by the +2 or -1 in the formula after (a cellpointer("col"). With formulas like this, your macros can operate on cells at a consistent remove from the cursor.

Felipe Quental  
Rio de Janeiro, Brazil

*Anything that reduces or speeds up cursor movement will make macros run faster. The second macro is especially helpful be-*

When the cursor is in cell B11 . . .

```
+="{goto}"&CHAR(64+@CELLPOINTER("col")+2)&STRING(@CELLPOINTER("row"),8)&"~"
... appears in spreadsheets as: {goto}D11~

+="{let "&CHAR(64+@CELLPOINTER("col")-1)&STRING(@CELLPOINTER("row"),8)&"&Hello!"
... appears in spreadsheets as: {let A11,Hello!}

@RID(@CELLPOINTER("address"),1,@IF(@CELLPOINTER("col")<=26,1,2))
```

Figure 1: String formulas that allow relative cell references in macros.

cause the cursor doesn't move at all. It could double or triple the speed of some routines, especially when the cell into which you want to enter a label is off the screen. You can, of course, adjust the row reference as well as the column reference by adding +3 or -4, for example, after ("row"). These adjustments can then be references to cells containing numbers rather than the numbers themselves. This way, you could change the relation of the referenced cell as necessary. Remember to recalc your macro formula when you move the cursor, because (a cellpointer doesn't update automatically.

One limitation of Mr. Quental's method is that the column references won't work in columns AA and beyond. This is because his formulas give you the character equivalent of a column number, not a column letter, and there's no ASCII number for AA, AB, etc. I have therefore included a third formula in Figure 1, which you can substitute for the column references in Mr. Quental's formulas. This, however, can't take a plus or minus value,

so the cell you reference has to be in the same column as the cursor . . .

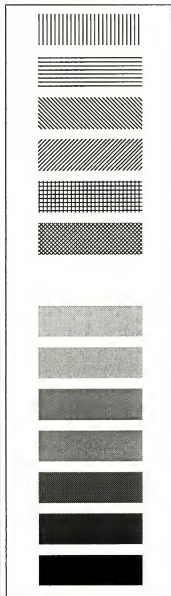
Microsoft Excel solves this problem by letting you make relative references directly in macros.

## SHADES OF MEANING

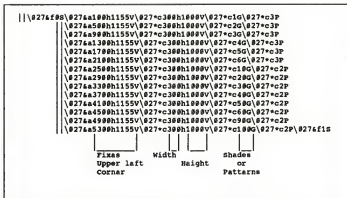
With the Hewlett-Packard LaserJet Plus, you can print 1-2-3 spreadsheets with a variety of patterns and shadings. Figure 2 shows the six available resident patterns and several of the shades of gray. You can print this set of patterns with the embedded printer control codes listed in Figure 3. Remember to type both vertical bars at the beginning of each code, even though 1-2-3 will display only one. Printer control codes must be in Column A.

The explanations beneath the codes tell you what the different numbers in the codes control. Remember that 1 inch equals 720 units, both vertically and horizontally. The first and last lines of code are different from the rest. The initial \027&f0S of the first line tells the printer to remember the location of the cursor. The

## ■ SPREADSHEET CLINIC



**Figure 2:** Patterns and shades you can add to your spreadsheet printout using the HP LaserJet Plus.



**Figure 3:** Embedded printer control codes for the HP LaserJet Plus used to produce the pattern in Figure 2. Printer setup string should be \027E.

\027&f1\$ at the end of the last line tells the printer to return to that location for subsequent printing. This way you can control where the patterns stop and normal spreadsheet texts begin.

In order to print this pattern, your spreadsheet should have a printer setup string of \027E. If you would like the spreadsheet to print horizontally (landscape mode), use the setup string \027E\027&llo. In order to avoid a printer error message, you may have to send a final reset string, \027E, at the end of the spreadsheet.

Rejean St.-Laurent  
Sherbrooke, Quebec  
Canada

*Nothing gussies up a spreadsheet printout more than laser-printed lines, shadings, and patterns. Besides including decorative borders, you can highlight certain parts of your spreadsheet by giving them a shaded background. This is possible because you can control the location of a pattern block as well as the cursor position for printing. Thus, if you want to make the Totals column of a spreadsheet stand out, you can give it a light gray background, which will call attention to it immediately. A great deal more is possible with careful coding of laser printers, but it can take some tweaking before the output is perfect. The HP Technical Reference Manual for the printer contains details on coding.*

#### ZERO-SUPPRESSION BUG

The /Worksheet Global Zero Yes command in 1-2-3 prevents display of results of formulas that evaluate to zero. This feature can make some worksheets look better, but it harbors a subtle bug.

With zero suppression on, enter a formula like 33-33, which evaluates to zero. Though the formula is present in the cell, there will be no display. Now hit F2 (Edit) and F9 (Calc). This normally turns a formula into a value, but not in this case. The display remains blank, since the result of the formula is still zero, but the underlying formula, 33-33, remains unchanged. This is not helpful, but there's worse.

It sometimes happens that you want to update values in a spreadsheet by immediate addition or subtraction. If you had the number 33 in a cell and wanted to add 12 to it, you could go to that cell, hit F2, type +12, and hit F9 <Enter>. The number immediately changes to 45. This works whether zero suppression is on or off. However, with zero suppression on, a change of this kind that results in a value of zero won't work. If, for example, you wanted to subtract 33 from a cell containing the value 33, you could go to the cell, hit F2, type -33, and hit F9. Instead of waiting for you to hit Enter, 1-2-3 returns you to the ready state with the original value of 33 unchanged. What should be zero is still 33. If zero suppression is turned off, the operation will work normally.

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July 27, 1987

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### QIC 286-10B

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## ■ SPREADSHEET CLINIC

If you do this manually, you may or may not notice that the resulting value is incorrect. If the procedure is carried out by a macro, you'll never know what went wrong.

Ervin Young  
Durham, North Carolina

*Ouch. Another obscure bug in America's favorite program. With zero suppression turned on, 1-2-3 fails to turn a formula that evaluates to zero into a value, no matter what arithmetic operation you use to change the value to zero. If, for example, you appended \*0 to the number 33 and hit F9, you'd get exactly the same results as appending -33. Ditto, if you have a value of zero already and append something like /25. Any change that results in an evaluation to zero gets wiped out when you hit F9 in Edit mode.*

*Fortunately, the /Range Value command correctly turns formulas that evalu-*

*ate to zero into values, whether zero suppression is on or off.*

### THANKS AND FAREWELL

*After 2½ years as editor of Spreadsheet Clinic, I am passing the job along to Douglas and Steven Cobb. Many of you*

■ The /Range Value command correctly turns formulas that evaluate to zero into values.

*know Doug already as the author of the standard work, 1-2-3: Tips, Tricks and Traps. Steve is perhaps best known as the author of the 1-2-3 User's Journal and the*

*Symphony User's Journal. Spreadsheet Clinic will benefit greatly from the vast knowledge of both brothers.*

*Editing this column has been a real education for me. I long ago gave up being amazed at the brains and creativity of the readers of PC Magazine. You have sent me an unending stream of brilliant discoveries. I'm sure you'll be just as generous with the Messrs. Cobb.*

*It's been a great 2½ years. Thank you all.—Jared Taylor*

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## ■ PAUL SOMERSON

# USER-TO-USER



Whatever became of DOS 3.3's EXE2BIN and DEBUG; batch files that grab variables from the environment that instruct DOS when to run programs and with what equipment.

## BATCH MAGIC

Press agent Marty Winston (best known these days for getting the scoop on the new IBM hardware before anyone else) represents Bourbaki Inc., a software company best known for its IDIR and related DOS utilities. His programmers whipped together three programs for him to run his systems unattended overnight to reindex database files, print reports, and get his electronic mail. They run certain programs on certain days only.

The first of the three programs, GETDATE.COM, returns an ERRORLEVEL of 1 to 31 equal to the current date-of-month. GETMONTH returns an ERRORCODE of 1 to 12, equal to the current month. DOW.COM returns an error code related to the day of the week, where Sun=0 and Sat=6.

To create the three programs, type in the DATES.SCR DEBUG script in Figure 1, using a pure-ASCII word processor or the DOS COPY CON command. Hit the Enter key after each line (especially the last one with the Q) and be sure to leave the spaces above the RCX lines. Then put DATES.SCR on the same directory as DEBUG.COM (2.0 or later) and type

```
DEBUG < DATES.SCR
```

To use these programs, create three SHOWMON.BAT, SHOWDATE.BAT, and WEEKDAY.BAT batch files in Figure 2. Substitute your own commands for the ECHO's to run programs at specified times.

Since the IF ERRORLEVEL operation

is a greater-or-equal comparison, it's best to nest IF statements in the form

```
IF ERRORLEVEL (N) IF NOT ERRORLEVEL (N+1) (RCX)GOTO
```

The alternative is to put one test on each line, interspersed with GOTO statements. The following WEEK2.BAT would yield the same results as WEEKDAY.BAT, but it's far longer:

```
ECHO OFF
REM This is WEEK2.BAT
DOW
IF ERRORLEVEL 1 GOTO 1
ECHO It's Sunday
GOTO END
:1
IF ERRORLEVEL 2 GOTO 2
ECHO It's Monday
GOTO END
:2
IF ERRORLEVEL 3 GOTO 3
ECHO It's Tuesday
GOTO END
:3
IF ERRORLEVEL 4 GOTO 4
ECHO It's Wednesday
GOTO END
:4
IF ERRORLEVEL 5 GOTO 5
ECHO It's Thursday
GOTO END
:5
IF ERRORLEVEL 6 GOTO 6
ECHO It's Friday
GOTO END
:6
ECHO It's Saturday
:END
```

```
N GETMONTH.COM
A 100
MOV AX, 2A
INT 21
MOV AL, DH
MOV AH, 4C
INT 21
INT 20
```

```
RCX
C
M
N GETDATE.COM
A 100
MOV AX, 2A
INT 21
MOV AL, DL
MOV AH, 4C
INT 21
INT 20
```

```
RCX
C
M
N DOW.COM
A 100
MOV AX, 2A
INT 21
MOV AH, 4C
INT 21
INT 20
```

```
RCX
C
M
Q
```

**Figure 1:** DATES.SCR DEBUG script to create GETMONTH.COM, GETDATE.COM, and DOW.COM programs. Type it in using a pure-ASCII word processor or the DOS COPY CON command. Hit the Enter key after each line (especially the last one with the Q) and be sure to leave the spaces above the RCX lines. Put it in the same directory as DEBUG.COM (2.0 or later) and type DEBUG < DATES.SCR

## ■ USER-TO-USER

Winston also pointed out that you could set environment variables rather than ECHOing directly. The following WEEKDAY2.BAT batch file will cycle through the choices, resetting the environment variable DAY until the IF test is no longer true, and then retrieve the current setting

and ECHO it to the screen.

```
ECHO OFF
REM This is WEEKDAY2.BAT
DOW
IF ERRORLEVEL 0 SET DAY=Sun
IF ERRORLEVEL 1 SET DAY=Mon
```

```
IF ERRORLEVEL 2 SET DAY=Tue
IF ERRORLEVEL 3 SET DAY=Wed
IF ERRORLEVEL 4 SET DAY=Thu
IF ERRORLEVEL 5 SET DAY=Fri
IF ERRORLEVEL 6 SET DAY=Sat
ECHO Day is %DAY%
```

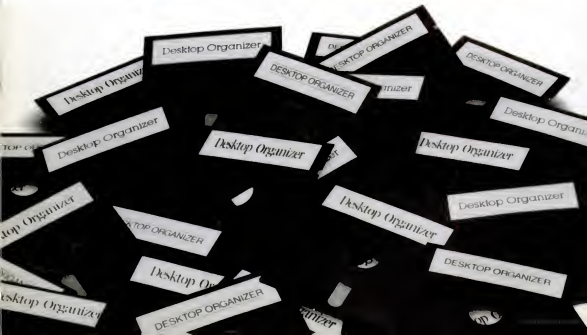
```
ECHO OFF
REM This is SHOWMON.BAT
GETMONTH
IF ERRORLEVEL 1 IF NOT ERRORLEVEL 2 ECHO Month = Jan
IF ERRORLEVEL 2 IF NOT ERRORLEVEL 3 ECHO Month = Feb
IF ERRORLEVEL 3 IF NOT ERRORLEVEL 4 ECHO Month = Mar
IF ERRORLEVEL 4 IF NOT ERRORLEVEL 5 ECHO Month = Apr
IF ERRORLEVEL 5 IF NOT ERRORLEVEL 6 ECHO Month = May
IF ERRORLEVEL 6 IF NOT ERRORLEVEL 7 ECHO Month = Jun
IF ERRORLEVEL 7 IF NOT ERRORLEVEL 8 ECHO Month = Jul
IF ERRORLEVEL 8 IF NOT ERRORLEVEL 9 ECHO Month = Aug
IF ERRORLEVEL 9 IF NOT ERRORLEVEL 10 ECHO Month = Sep
IF ERRORLEVEL 10 IF NOT ERRORLEVEL 11 ECHO Month = Oct
IF ERRORLEVEL 11 IF NOT ERRORLEVEL 12 ECHO Month = Nov
IF ERRORLEVEL 12 ECHO Month = Dec
```

```
ECHO OFF
REM This is SHOWDATE.BAT
GETDATE
IF ERRORLEVEL 1 IF NOT ERRORLEVEL 2 ECHO Date = 1st
IF ERRORLEVEL 2 IF NOT ERRORLEVEL 3 ECHO Date = 2nd
IF ERRORLEVEL 3 IF NOT ERRORLEVEL 4 ECHO Date = 3rd
IF ERRORLEVEL 4 IF NOT ERRORLEVEL 5 ECHO Date = 4th
IF ERRORLEVEL 5 IF NOT ERRORLEVEL 6 ECHO Date = 5th
IF ERRORLEVEL 6 IF NOT ERRORLEVEL 7 ECHO Date = 6th
IF ERRORLEVEL 7 IF NOT ERRORLEVEL 8 ECHO Date = 7th
IF ERRORLEVEL 8 IF NOT ERRORLEVEL 9 ECHO Date = 8th
IF ERRORLEVEL 9 IF NOT ERRORLEVEL 10 ECHO Date = 9th
IF ERRORLEVEL 10 IF NOT ERRORLEVEL 11 ECHO Date = 10th
IF ERRORLEVEL 11 IF NOT ERRORLEVEL 12 ECHO Date = 11th
IF ERRORLEVEL 12 IF NOT ERRORLEVEL 13 ECHO Date = 12th
```

(continues)

Figure 2: SHOWMON.BAT, SHOWDATE.BAT, and WEEKDAY.BAT batch files that use GETMONTH.COM, GETDATE.COM, and DOW.COM programs. You can adapt these by substituting commands in place of ECHO's to execute programs at specified times.

# 50 DESKTOP ORGANIZERS.



The advantage here is that once you've run WEEKDAY2.BAT, other programs and batch files can grab the DAY variable directly from the environment without having to rerun the WEEKDAY2.BAT and DOW.COM. The DAY variable and its value don't take up much environment space, but you should consider expanding your environment just in case. Or, as Whistou suggests, insert a placeholder

**SET DAY=XXX**  
command in your AUTOEXEC.BAT file to reserve the few bytes needed.

It's simple to adapt this process to re-portion on anything DOS can sniff out. For instance, by creating the ID.COM and MODEREAD.COM programs (from the IDMODE.SCR DEBUG script in Figure 3) and the HARDWARE.BAT and SHOWMODE.BAT batch files in Figure 4, you

can tell a batch file what the current CPU and video mode are.

Testing a mode like 80 by 25 CGA 16-color text (which is what EGA default text thinks it's in) is simple; you can run the batch file at the DOS command line. Testing for something like 640 by 200 CGA B&W graphics is a bit more complicated. Just get into BASIC and type

**SHELL "SHOWMODE"**

```
IF ERRORLEVEL 13 IF NOT ERRORLEVEL 14 ECHO Date = 13th
IF ERRORLEVEL 14 IF NOT ERRORLEVEL 15 ECHO Date = 14th
IF ERRORLEVEL 15 IF NOT ERRORLEVEL 16 ECHO Date = 15th
IF ERRORLEVEL 16 IF NOT ERRORLEVEL 17 ECHO Date = 16th
IF ERRORLEVEL 17 IF NOT ERRORLEVEL 18 ECHO Date = 17th
IF ERRORLEVEL 18 IF NOT ERRORLEVEL 19 ECHO Date = 18th
IF ERRORLEVEL 19 IF NOT ERRORLEVEL 20 ECHO Date = 19th
IF ERRORLEVEL 20 IF NOT ERRORLEVEL 21 ECHO Date = 20th
IF ERRORLEVEL 21 IF NOT ERRORLEVEL 22 ECHO Date = 21st
IF ERRORLEVEL 22 IF NOT ERRORLEVEL 23 ECHO Date = 22nd
IF ERRORLEVEL 23 IF NOT ERRORLEVEL 24 ECHO Date = 23rd
IF ERRORLEVEL 24 IF NOT ERRORLEVEL 25 ECHO Date = 24th
IF ERRORLEVEL 25 IF NOT ERRORLEVEL 26 ECHO Date = 25th
IF ERRORLEVEL 26 IF NOT ERRORLEVEL 27 ECHO Date = 26th
IF ERRORLEVEL 27 IF NOT ERRORLEVEL 28 ECHO Date = 27th
```

```
IF ERRORLEVEL 28 IF NOT ERRORLEVEL 29 ECHO Date = 28th
IF ERRORLEVEL 29 IF NOT ERRORLEVEL 30 ECHO Date = 29th
IF ERRORLEVEL 30 IF NOT ERRORLEVEL 31 ECHO Date = 30th
IF ERRORLEVEL 31 ECHO Date = 31st
```

ECHO OFF

REN This is WEEKDAY.BAT  
DOW

```
IF ERRORLEVEL 8 IF NOT ERRORLEVEL 1 ECHO Sun
IF ERRORLEVEL 1 IF NOT ERRORLEVEL 2 ECHO Mon
IF ERRORLEVEL 2 IF NOT ERRORLEVEL 3 ECHO Tue
IF ERRORLEVEL 3 IF NOT ERRORLEVEL 4 ECHO Wed
IF ERRORLEVEL 4 IF NOT ERRORLEVEL 5 ECHO Thu
IF ERRORLEVEL 5 IF NOT ERRORLEVEL 6 ECHO Fri
IF ERRORLEVEL 6 ECHO SAT
```

(Figure 2 ends)

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## ■ USER-TO-USER

```
N ID.COM
A 100
MOV AX,F000
MOV DS,AX
MOV BX,FFFF
MOV AX,[BX]
MOV AH,4C
INT 21
INT 20
```

```
RXC
1B
N
N MODEREAD.COM
A 100
MOV AH,0F
INT 10
MOV AH,4C
INT 21
INT 20
```

```
RXC
A
N
Q
```

**Figure 3:** IDMODE.SCR DEBUG script to create ID.COM and MODEREAD.COM programs to be used with HARDWARE.BAT and SHOWMODE.BAT batch files. Type it in using a pure-ASCII word processor or the DOS COPY CON command. Hit the Enter key after each line (especially the last one with the Q) and be sure to leave the spaces above the RXC lines. Then put it in the same directory as DEBUG.COM (2.0 or later) and type DEBUG < IDMODE.SCR

### THANK YOU, IBM

The new DOS Version 3.3, does not include the EXE2BIN.EXE program that was on every previous DOS disk. Instead, IBM sells the program separately, at an extra cost, with the DOS Technical Reference. Worse, the DOS 3.2 EXE2BIN program that many 3.3 users still have handy won't run under DOS 3.3, since it contains

■ DOS 3.3 does not include EXE2BIN.EXE, which was on every previous DOS disk.

a tiny routine to make sure you're using it with DOS 3.2 only.

Fortunately, it's simple to patch the DOS 3.2 EXE2BIN.EXE so that it runs under Version 3.3. Just get into DOS and type in the following commands:

```
REN EXE2BIN.EXE E
DEBUG E
E 30D 73
W
Q
REN E EXE2BIN.EXE
```

The EXE2BIN.EXE routine that checks for the DOS version looks like this:

```
MOV AH,30
INT 21
XCHG AH,AL
CMP AX,0314
JZ 0320
```

Changing the byte at address 30D from 74 to 73 turns the JZ instruction into a JNB instruction, which lets the routine work if it finds a version of DOS 3.2 or higher.

Asael Dror  
Oakland, California

IBM also left all the DEBUG documentation out of the DOS 3.3 manual, and replaced it with a lot of gobbledygook about loading foreign fonts into the IBM laptop computer screen. (Of course, you can al-

■ IBM left all the DEBUG documentation out of the DOS 3.3 manual and replaced it with gobbledygook about loading foreign fonts into the laptop screen.

ways take the DEBUG section out of your old DOS 3.2 manual and insert it in the newer one.)

This patch does the job. But while the unpatched 3.2 version of EXE2BIN won't work under 3.3, the versions supplied with 3.1 and 3.0 will, so you could use them instead.

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```
ECHO OFF
REN This is HARDWARE.BAT
ID
IF ERRORLEVEL 251 IF NOT ERRORLEVEL 252 ECHO System = PS/2
IF ERRORLEVEL 252 IF NOT ERRORLEVEL 253 ECHO System = AT
IF ERRORLEVEL 253 IF NOT ERRORLEVEL 254 ECHO System = PCjr
IF ERRORLEVEL 254 IF NOT ERRORLEVEL 255 ECHO System = XT
IF ERRORLEVEL 255 IF NOT ERRORLEVEL 256 ECHO System = PC

ECHO OFF
MODEREAD
IF ERRORLEVEL 0 IF NOT ERRORLEVEL 1 ECHO 40x25 CGA B&W text
IF ERRORLEVEL 1 IF NOT ERRORLEVEL 2 ECHO 40x25 CGA 16 color text
IF ERRORLEVEL 2 IF NOT ERRORLEVEL 3 ECHO 80x25 CGA B&W text
IF ERRORLEVEL 3 IF NOT ERRORLEVEL 4 ECHO 80x25 CGA 16 color text
IF ERRORLEVEL 4 IF NOT ERRORLEVEL 5 ECHO 320x200 CGA 4 color graphics
IF ERRORLEVEL 5 IF NOT ERRORLEVEL 6 ECHO 320x200 CGA 4 greys graphics
IF ERRORLEVEL 6 IF NOT ERRORLEVEL 7 ECHO 640x200 CGA B&W graphics
IF ERRORLEVEL 7 IF NOT ERRORLEVEL 8 ECHO 80x25 Mono B&W text
IF ERRORLEVEL 8 IF NOT ERRORLEVEL 11 ECHO 640x200 EGA 64 color graphics
IF ERRORLEVEL 11 IF NOT ERRORLEVEL 14 ECHO 320x200 EGA 16 color graphics
IF ERRORLEVEL 14 IF NOT ERRORLEVEL 15 ECHO 640x200 EGA 16 color graphics
IF ERRORLEVEL 15 ECHO 640x350 EGA 4 color graphics
```

**Figure 4:** HARDWARE.BAT and SHOWMODE.BAT batch files that use ID.COM and MODEREAD.COM to tell batch files the correct CPU and video modes.

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■ EDITED BY CRAIG L. STARK



# POWER USER

*A better way to enhance printouts by combining the best features of both Microsoft Word and Write; working around the 254-character command-line limit in dBASE.*

## BEYOND LEN(254)

The maximum dBASE command line length is 254 characters. This is usually sufficient but not always—especially with lengthy logical expressions. When this occurs, it is sometimes possible to “divide and conquer.”

For example, in the IF...ENDIF structure below, an impossible command line length of over 350 characters is required.

```
IF Lname=lname .AND. Fname=fname;
  .AND. Address=address .AND. City=city;
  .AND. Zip=zip .AND. Date=mdate;
  .AND. (Account=account .OR. iflook);
  .AND. CREDIT->Maxcredit<credit;
  .AND. RATE->Interest<interest;
  .AND. (SALES->Amount<amount;
  .OR. SALES->Amount<sale_aver);
  .AND. (Cost=cost .OR. Cost<Cost_aver;
  .OR. Cost=8)
  * do commands for TRUE
ELSE
  * do commands for FALSE
ENDIF
```

The work-around is to break the condition into smaller parts (each with less than 254 characters), evaluate them separately, then do the IF test:

```
STOR LEAVE=leave .AND. Fname=fname;
  .AND. Address=address .AND. City=city;
  .AND. Zip=zip .AND. Date=mdate;
  .AND. (Account=account .OR. iflook);
  TO cond1

STOR CREDIT->Maxcredit<credit;
  .AND. RATE->Interest<interest;
  .AND. (SALES->Amount<amount;
  .OR. SALES->Amount<sale_aver);
  .AND. (Cost=cost .OR. Cost<Cost_aver;
  .OR. Cost=8) TO cond2

IF cond1 .AND. cond2
  * do commands for TRUE
ELSE
  * do commands for FALSE
ENDIF
```

Another nice idea for initializing logical

expressions is to replace

```
IF 100>x
  logic=.T.
ELSE
  logic=.F.
ENDIF
```

with the much simpler

```
logic=100>x
```

It's almost always better to process one line of code than five.

Alan Queen  
Boise, Idaho

*If you have the unenviable job of writing logic statements that are so long they sound like (and are about as clear as) a politician's speech, Mr. Queen's "divide-and-conquer" approach is just the ticket. Of course, like a politician, it won't move as fast when making a decision.*

*His second idea can lead to an unusual*

■ With logic statements that are so long they sound like a politician's speech, Mr. Queen's “divide and conquer” approach is just the ticket.

line of code. Suppose you have a name file with a field called “sex”. 1 byte long, containing either “M” or “F”. If you are currently positioned on the record for Dorothy, you can STORE a logic variable with this syntax:

```
. logicvar=sex="F"
```

*It's remarkable that dBASE allows the two equal signs in the same expression, but when entered, dBASE evaluates it.*

—Brad Stark

## EASIER DROP CAPS

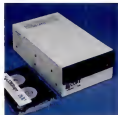
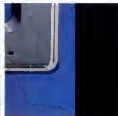
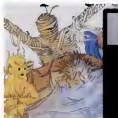
In the August 1987 issue David M. H. Butler described how to make the first letter in a paragraph larger than the remaining text when using Microsoft Word. It was a clever trick, but for those who also have Windows Write, there's a much less cumbersome way to create drop caps. This approach has the additional advantage of working with other programs besides Word.

Windows Write lets you change the size or the font for any portion of a document. To produce drop caps, then, you have only to highlight the first letter in the paragraph and hit F10. With each successive keypress, the letter grows larger.

Microsoft Windows Write is designed so that any document created by Microsoft Word can be loaded into Windows Write without any modification whatsoever. Thus, all you have to do is create the file in Word, start up Windows, and point to the document filename. Windows will automatically run Write and load the file. You can then create drop caps (or any other



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## ■ EDITED BY ROBERT L. HUMMEL

# LANGUAGES



*A Turbo Pascal file encryption program to stump most would-be code breakers; BASICA's number-formatting problems; a C program that captures printer output.*

## BASICA

### NONEXISTENT NUMBERS

I was writing a program in BASIC, recently, and discovered the strangest thing—I couldn't print a simple number such as 8.1. I was pretty surprised to discover that other seemingly normal numbers couldn't be printed either, so I wrote the enclosed program (see Figure 1) to list the range of numbers between 1 and 100. It appears there are quite a few numbers that my IBM PC is unable to display.

IBM's response to this was very annoying. The company said that nothing could be done, and the only way to avoid the problem is to use BASIC's Print Using statement. It seems unreasonable to me that I should have to handle IBM's errors.

Paul M. Hansen  
Quakertown, Pennsylvania

*Don't be too hard on IBM, because this problem isn't really its fault. Floating-point (fractional) numbers are stored in a PC's memory in either 4 or 8 bytes, but in a binary representation. The fact that only*

*a limited amount of space is set aside means that certain values simply can't be stored correctly. Furthermore, the conversion from decimal to binary causes other unavoidable rounding errors.*

*One solution is to use Microsoft's QuickBASIC compiler. While switching to QuickBASIC won't eliminate the problem entirely, its numeric conversion is greatly improved over that used by the BASIC interpreters.—Ethan Winer*

## C

### REDIRECT THE PRINTER

Instead of generating reams of paper, I sometimes find it useful to capture my printer output in a disk file. To make this task easy, I wrote REDIR, listed in Figure 2, to function much like the redirection facilities of DOS. With REDIR, printer output is sent to a disk file that you specify. The syntax is

REDIR yourfile program [arguments...]

where "yourfile" is the name of the file to

which printer output will be sent. "Program" is the name of any program, just as you would type it at the DOS prompt (with optional arguments). You can still redirect the standard input/output with "<" and ">" just as you ordinarily do.

Lawrence J. Gajdos, Ph.D.  
Chadds Ford, Pennsylvania

REDIR demonstrates a technique that is a "knock-off" for C, specifically I/O redirection. It also takes advantage of a fact about DOS that is not widely known.

When you run a program, DOS opens five files or devices for use by the program: standard input (keyboard), standard output and standard error (monitor), standard auxiliary, and standard printer. These are defined in C as FILE pointers: *stdin*, *stdout*, *stderr*, *stdaux*, and *stdprn*, respectively.

A call to the standard library function *freopen()* will close one "file" and reassign its FILE pointer to another. So the call to *freopen()* in the listing forces *stdprn*, which points to the default printer device, to represent the file named in its first parameter. And all future output to *stdprn* will be redirected to that file instead.

The additional trick is that DOS will always pass the open files of one process to a subprocess, so that a second, or "child" program, "inherits" the open files of the first.

The call to *spawnvp()* will run the second program, which can send characters to *stdprn*. The second program, or "child" process, doesn't know that its

```

100 T = 100
110 WHILE "1pt1", 132 'set printer to compressed mode before running
120 LPRINT "IBM's non-existent numbers from 1.00 to 100.00"
130 LPRINT
140 FOR X = 100 TO 10000
150 A = X / 100
160 AS = STR$(A)
170 IF LEN(AS) > 7 THEN GOSUB 200
180 NEXT X
190 END
200 IF T > 99 THEN T = 1: LPRINT: ELSE T = T + 25
210 LPRINT TAB(7): LPRINT USING "###.##": A: LPRINT " is" A:
220 RETURN

```

Figure 1: A program that demonstrates BASICA's "illegal" numbers.

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## ■ LANGUAGES

```
/* redir.c

Redirects printer output to a disk file

To compile with Microsoft C 4.0/5.0:
cl redir.c

To compile with QuickC:
cl /go redir.c

*/
#include <stdio.h>
#include <process.h>

main(argc, argv)
int argc;
char **argv;
{
    FILE *freopen();
    int error = 0;

    /* Check for proper number of arguments */
    if(argc < 3)
    {
        fprintf(stderr, "REDIR yourfile program [arg]\n", stderr);
        exit(1);
    }

    /* redirect stdout to specified file */
    if(freopen(argv[1], "a", stdout) == NULL)
    {
        perror(argv[1]);
        exit(1);
    }
    fprintf(stderr, "\nPrinter capture file opened: %s\n", argv[1]);

    /* invoke target program */
    if(spawnvp(P_WAIT, argv[2], &argv[3]) < 0)
    {
        error = 1;
        perror(argv[2]);
    }

    /* restore stdout to PRN */
    freopen("PRN", "w", stdout);
    fprintf(stderr, "\nPrinter capture file closed: %s\n", argv[1]);

    exit(error);
}
```

Figure 2: A C program to allow redirection of printer output.

printer output is going to a disk file, but that's exactly what's happening. It's completely transparent, since `stdout` has been redirected.

After returning to the "parent" program, the output file can be closed and the printer reopened with another call to `freopen()`. C allows the use of PRN as the printer filename just as you would use it on the command line.

There are two caveats with this approach though. Printer programs that use BIOS interrupt 17h will still go directly to the printer. That's because DOS itself sends `stdout` output to Int 17h to write to the printer, and output sent to Int 17h will never go to `stdout`.

Second, `spawnvp()` is designed to execute .COM and .EXE files but not internal DOS commands or .BAT files.

—Richard Hale Shaw

Richard Hale Shaw is a microcomputer consultant and software engineer who works in Louisville, Kentucky.

## TURBO PASCAL

### ENCRYPTING FILES

I work on a hard disk system that is accessible to a number of users. I thought it would be nice if I could leave my files on it and yet have their contents safe from prying eyes. I started thinking about data en-

# How Farsighted Executives Are Using Their PC's For The Fun Of Profit.

By William J. Spink

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## ■ LANGUAGES

```
PROGRAM CRYPTO;
CONST
  MaxInBuffer = 16384;
VAR
  buffer : ARRAY[1..MaxInBuffer] OF Byte;
  I, KeyLoc, ActualRead : Integer;
  InputFile : FILE;
  InputFileName, Key : STRING[255];

BEGIN
  IF ParamCount < 2 THEN
    GOTO
  ELSE
    WriteLn('SYNTAX: CRYPTO <filename> <keyword>');
    WriteLn('Keyword can be a phrase -- as many words as you can fit. ');
    WriteLn('E.g. "CRYPTO ALICE.DAT Just the place for a Shark"');
    Halt;
  END;

  InputFileName := ParamStr(1);
  Assign(InputFile, InputFileName);
  ($I-) Reset(InputFile, 1); ($I+)
  IF IOResult <> 0 THEN
    GOTO
  ELSE
    WriteLn('#7, "FILE ', InputFileName, ' does not exist!');
    Halt;
  END;

  Key := '';
  FOR I := 2 TO ParamCount DO
    Key := key + ParamStr(I);
  END;

  KeyLoc := Length(Key);

  REPEAT
    ActualRead(InputFile, Buffer, MaxInBuffer, ActualRead);
    FOR I := 1 TO ActualRead DO
      Buffer[I] := Buffer[I] XOR Ord(Key[Mod(Pred(I) MOD KeyLoc)]);
    LongSeek(InputFile, LongFilePos(InputFile)-ActualRead);
    ActualWrite(InputFile, Buffer, ActualRead);
  UNTIL EOF(InputFile);
  Close(InputFile);
END.
```

Figure 3: An XOR-encryption program in Turbo Pascal.

ryption and came up with a scheme that is simple to implement, yet difficult to break. It's fast and works on any type of file.

It works on the principle that if you ex-

■ I came up with a data encryption scheme that is simple to implement, yet difficult to break.

clusive-OR (XOR) a data byte, A, with a key byte, K, you end up with a new value, B, that's different from A as long as the key is nonzero. By XORing byte B with key K, you get the original value of byte A back again.

If you XOR the key with each byte in a file, you have changed the file from plain-

text to unreadable cipher-text. However, just using a single byte for the key isn't very secure. Someone who knows how you encrypted your file has to try at most 256 different keys to recover the original plain-text.

So instead of using just a single byte for the key, my algorithm uses a key phrase that you specify. The CRYPTO program in Figure 3 XORs each byte in the plain-text with the corresponding byte in the key. It XORs plain-text byte 1 with key byte 1, plain-text byte 2 with key byte 2, and so on. When it runs out of keys, it starts again with key byte 1. This process continues until all the bytes in the plain-text file are encrypted.

To encrypt a file, just type

**CRYPTO InputFile key**

where InputFile is the name of the file you wish to encrypt. The key phrase can be as long as the command line allows. CRYPTO will rewrite the encrypted file using the





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## ■ LANGUAGES

same name as the original, so be sure to remember the key. To reverse the process and decrypt your file, you simply use the same command line.

The XOR encryption program I've shown here is intended to demonstrate how easy it is to have a fairly high level of

■ While the folks at the NSA crack stuff like this on their lunch hour, this XOR encryption program should provide adequate security against the casual snooper.

data security. While I'm sure that the folks at the National Security Agency crack stuff like this on their lunch hour, it should provide more than adequate security against the casual snooper.

Allen Moore  
Redmond, Washington

*This type of encrypting scheme doesn't actually require a computer, and similar methods have been implemented using code pads for centuries.*

*Having a quick utility to perform the operation for you, however, is infinitely preferable. If you must encrypt large numbers of files with different keys, you should consider creating a single text file listing each file-key pair. After encrypting this file, you'll have only one key to remember.*

—Neil J. Rubenking

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■ ROBERT L. HUMMEL

# PC TUTOR



*How assembly language pseudo-operations like JMP \$+2 work with the pre-fetch queue; DEBUG still lives in DOS 3.3, but you must use an older version of EXE2BIN.*

## JUMPING TO CONCLUSIONS

I'm trying to learn assembly language, and the program listings and explanations published in *PC Magazine* are one of the chief reasons I subscribe. In the October 27, 1987, *PC Tutor*, you printed an assembler listing for SCAN.COM. In the INT\_9 procedure, a JMP \$+2 instruction is included. No other reference to this "\$+2" is listed anywhere in the program. I checked my Macro Assembler manual but drew a blank. Can you explain this mysterious instruction?

Henry Dove  
Mount Upton, New York

Part of the beauty and aggravation of assembler code is that a simple question can often require a very complicated answer. To address the issues here, I'll answer this in two parts. The first question to address is "What does the \$ mean?"

Like procedure names, variable names, and labels, the \$ used in the assembly instruction JMP \$+2 is a pseudo-op. It is an instruction that is used to communicate specifically with the MASM program, not a command for the CPU, and it does not appear in the final compiled program.

In its simplest sense, the "location counter" (as \$ is called) has the same attributes and uses as a NEAR label. That is, you can jump to it, use it as a data address, and find its position in the segment. It can function as an instruction address that is relative to the current segment, and its offset is equal to the number of bytes generated for that segment to that point. The explanation of this operator is hidden deep

within the Macro Assembler Reference Manual (section 5.2.4 of the *Microsoft MASM 4.0 documentation*).

The best way to illustrate the usefulness of the location counter is through examples. Other than for jumping around, the \$ can be used for the purpose of finding the offset of a particular instruction. For example, the instruction

```
MOV AX,OFFSET $
```

would place in AX the number of bytes in the current segment that preceded the instruction—in other words, the offset of the instruction within that segment. However, I can't really think of a good reason why you'd want to do this.

More-useful examples arise when you're working with strings and tables. Assume you're writing a program that stores strings, such as error messages, in counted-byte format. In such a case, the first byte of the string contains the number

of bytes of text that follow. For example:

```
STRING DB 8,"Bad Disk"
```

If you were later to decide to change this message, you would have to recount the characters and change the first byte. If you forgot or miscounted, you might wind up with a partial message or with garbage on the screen. But if you're willing to let the assembler do some of the work, you can use the following instructions:

```
STRING DB OFFSET STRING_END - 6 - 1
STRING_END EQU $
```

Given this code, the assembler will count the bytes between STRING and STRING\_END and will fill in the value automatically. While it may not look as pretty or as simple as the first example, the second allows you to edit the string without counting bytes. And if instead of a single string you had stored 500 strings, the effort saved in counting would be tremendous. Note that while the second example took three lines of source code, the machine code it produces is exactly the same size as the single-line example.

The third instruction, STRING\_END EQU \$, can be read, slightly ungrammatically, as "the label STRING\_END has the location of here" and could have been replaced with an actual label, "STRING\_END:". So why not just use the label form? In this case you could, but consider the following example:

```
MESSAGE DB "PUT DISK IN DRIVE A:"
```

This would work fine if you wanted to use only the first drive. But if you wanted to

■ A pseudo-op is an assembly language instruction used to communicate with the MASM program, not a command for the CPU.



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## PRODUCTIVITY

### ■ PC TUTOR

have your program prompt for either drive A: or B:, you would have to put in two versions of the string. Alternatively, you can have your program put the drive letter in at location MESSAGE + 18. But by using the location operator, you can simplify things.

```
MESSAGE DB "PUT DISK IN DRIVE A:"
DISKPTR EQU $+2
```

Now you can move an alternate drive letter into the string by referencing the new label.

MOV BYTE PTR DISKPTR, "B"

(Since the only thing the assembler knows about the name DISKPTR is its location, you must specify that you wish to reference a byte.)

The example in the SCAN.ASM program was a jump instruction, JMP \$+2. When I use the location counter, I always pronounce it in my head as "here." So the instruction reads "jump to two bytes from here." Since the instruction to jump two bytes forward occupies only two bytes, the effect is simply to jump to the next instruction. In other words, it's a null operation or NOP.

Loading SCAN.COM under DEBUG and examining the jump instruction after it has been assembled will produce the following:

```
DEBUG SCAN.COM
-U 153 158
XXXX:0153 B020 MOV AL,20
XXXX:0155 E800 JMP 0157
XXXX:0157 E620 JNT 20,AL
```

The segment, which will vary depending on your configuration and has no significance for our purpose, is represented by xxxx, but the offsets should be the same. It can be seen that the JMP \$+2 instruction, located at offset 155h, has been translated into the instruction JMP 0157, i.e., jump to the next instruction. So, if the instruction is the same as a NOP, why not just use a NOP? And why put a seemingly useless instruction in the middle of the program? To answer that again requires a little background.

**THE PRE-FETCH QUEUE** All the members of the Intel 80xx microprocessor family used in the PC family have some hardware in the CPU known as a "pre-



fetch queue." This is simply a function built into the microprocessor that reads the next few bytes of instructions from RAM into a small queue on the chip. When the processor is ready to execute an instruction, it pulls it from the queue and thus is not limited by the relatively slow memory access to RAM. The operation of the pre-fetch queue can be demonstrated by firing up DEBUG and building a small example program.

First, make sure DEBUG is in your current directory or in a directory pointed to by your PATH statement. Then enter the instructions shown in Figure 1 as you follow along with the text. Don't type the semicolons or the comments to the right of them, but read them, for they explain what's happening. Again, the `xxxx` is used to represent the segment, which will vary from computer to computer. The program `FETCH.COM` illustrates the operation of the pre-fetch queue in the processor of your computer.

To understand what is happening here let's take it step by step. First, a program called `FETCH.COM` is created (step 1) and saved to disk (step 2). The program deliberately uses a technique that most programmers loathe and try to avoid at any cost: it modifies its own code. Specifically, it changes the `JMP 107` instruction, at offset `105h`, to `JMP 108`. You can see this by tracing through the program with `DEBUG`. Step 3 is to enter the `R` (Register) command to show the current instruction (the register dumps have been omitted from the figure for clarity). After the first instruction is executed using the `Trace` command (step 4), the jump address in the second line has changed.

Now let's reload the program with the `L` command (step 5). Unassemble the program to ensure that the `JMP` instruction is unmodified (step 6). The `G` command causes the program to execute until it reaches one of the listed addresses. In step 7, we start the program and have it stop at either address `107` or `108`, whichever it reaches first. Although we know that the first instruction changes the second to `JMP 108`, the program stops at `107`. But if we check the instruction (step 8), the program shows the jump was changed to `108`. This seeming contradiction is an example of the pre-fetch queue at work.

By the time the CPU begins to execute the `MOV` instruction, the pre-fetch circuitry has already buffered the next instruction. Although the RAM holding the `JMP` is modified, the CPU still executes the original instruction, as read from the pre-fetch queue. When tracing single instructions under `DEBUG`, the CPU is being used for other tasks (such as, for instance, displaying the `DEBUG` output) besides executing the program. This forces the re-reading of each instruction just before it is executed. But, thanks to the `G` command, the program instructions were executed without interruption and the CPU used the queued instructions. Schemes similar to this one are sometimes used to prevent snoopers from tracing through programs with `DEBUG`.

To prevent such execution errors, a method of "flushing" the queue must be employed. The Intel processors automatically flush the queue whenever a `JMP` instruction is performed. Thus, if we had a `JMP` after the `MOV` instruction—even a jump to the next instruction—the queue would have been emptied and the modified jump instruction read in.

**A QUESTION OF TIME** So, in `SCAN.COM`, the effect of the `JMP $+2` is to flush the pre-fetch queue, something the `NOP` instruction will not do. But the purpose of the instruction is something different still. The instructions immediately before and after the jump are I/O operations

■ To prevent execution errors, a method of "flushing" the queue is used. Intel processors flush the queue whenever a `JMP` is performed.

on port `20h`, the interrupt controller. The execution of read/write instructions to a single port is referred to as "back-to-back" I/O and happens very quickly. On machines that run much faster than the

```

-N FETCH.COM ;(1)give the program a name
-A 100 ;start assembly
MOV BYTE PTR [106],1 ;modify next instruction
JMP 107 ; to a JMP 108
NOP ;a space filler
RET ;a space filler
;blank line - press ENTER
;put the length in CX
;9 bytes
;(2)write to disk

-N
Writing 0009 bytes

-R ;(3)show current instruction
XXXX:0100 C086040101 MOV BYTE PTR [0106],01 DS:0100=08

-T ;(4)trace one instruction
;it changed!
XXXX:0105 EB01 JMP 0109

-L ;(5)reload original program

-U 100 100 ;check the program
XXXX:0100 C086040101 MOV BYTE PTR [0106],01
XXXX:0105 EB00 JMP 0107
XXXX:0107 90 NOP
XXXX:0108 C3 RET

-G 107 108 ;(6)stop at either 107 or 108
XXXX:0107 90 BOP ;program jumped to 107!

-U 105 107 ;(7)check the instruction
;it reads 108!
XXXX:0105 EB01 JMP 0109

-Q ;quit DEBUG

```

Figure 1: A demonstration of the CPU pre-fetch queue in operation.

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## ■ PC TUTOR

4.77-MHz PC, the device on the other side of the port may not have sufficient time to process the information from the first operation before the second one is received. The result is an error or lost data.

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## VANISHING PROGRAMS

I recently ordered DOS 3.3, planning to upgrade my PC. I have heard, however, that the DEBUG and EXE2BIN programs are no longer included on distribution disks. I rarely need these programs, but on occasion they come in handy. Can I use the versions from my old DOS 2.1, or would this cause a system crash or worse?

Raymond Nichols  
Warren, Pennsylvania

The rumors of DEBUG's demise have been greatly exaggerated, and it is very much present in the distribution copies of IBM PC-DOS 3.3. EXE2BIN, however, was not so lucky. As DOS continues to grow in size, Microsoft and IBM continue to cut support programs from the disks to make room. In this case, you're in luck: the version of EXE2BIN included in PC-DOS 2.1 will run under all later versions. This is not true of many programs included with DOS.

In addition, a public-domain version of EXE2BIN appeared very soon after the release of DOS 3.3, and it is available for downloading from the PC Magazine Interactive Reader Service.

## ASK THE PC TUTOR

The PC Tutor solves practical problems and explains points of general interest about using your hardware and software more productively, and answers basic questions about DOS and systems in general. To see your questions answered here, drop a line to PC Tutor, PC Magazine, One Park Avenue, New York, NY 10016. We're sorry, but we cannot answer questions personally.

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■ FRANK J. DERFLER, JR.

# CONNECTIVITY CLINIC



*Advice from two readers on battling PC LAN's extra form feeds; communicating with an HP 3000 minicomputer over a LAN; ordaining a network for a minister and his secretaries.*

## UNWANTED FORM FEEDS FROM PC LAN—THE SEARCH FOR A CURE CONTINUES

*In our October 13, 1987, issue, a reader asked how to stop IBM's PC Local Area Network Program from sending unwanted form feeds. Because some programs or actions like typing*

**DIR C: >PRN:**

*don't automatically generate a form feed, PC LAN inserts a carriage return and form feed (ASCII 13,12) at the end of every spooled output, without option. Unfortunately, this means that programs that do add the form feed can waste expensive pre-printed forms or checks.*

*We received many letters from people with the same problem, but no software patches to correct it. While it is true that people are less likely to "hack" on operational LANs, hasn't anyone found a way to optionally silence this "jabbering" network program?*

*Here are two letters on the subject. One explains it and the other provides an external hardware fix.*

The reason PC LAN ejects is because it has no way of being sure the user can send the form feed. This has been debated on ASKINFO and within IBM. An example will show why the ejection is a good idea.

Two users are talking to the same printer. User1 types

**DIR C: >PRN:**

and gets to the printer before User2, doing a word processing doc. Neither DIR nor

PIPING generates a form feed. User2's doc starts on the same page as User1's DIR if an automatic form feed isn't sent.

The only solution for a user losing blank forms is to have the application not send form feeds. IBM will not change PC LAN; I've asked.

By the way, the current version of PC LAN is 1.22. Users of 1.2x can upgrade at no charge. They should contact their point of sale, IBM rep, or tech coordinator. The EQUAL/ASKINFO item number is 072MD.

Michael W. Butler  
Concord, California

We have the same problem with unwanted form feeds. Our solution uses a printer-sharing/serial and parallel adapter/buffer box that goes in-line between a PC and a printer to filter out the CR-LF from the PC LAN program.

For a filter device, we use a Systemizer

from Applied Creative Technology, Dallas, Texas. The Systemizer is programmed to translate the input file into an output string acceptable for different kinds of printers. You send commands to the Systemizer using the DOS COPY command to transmit a file called FILTER.DAT out the serial port. I've included an example of both FILTER.DAT and a batch file, FILTER.BAT, used to send it.

Since you want to filter only the carriage return and form feed that PC LAN inserts at the end of the print stream, you must first identify the unique string of characters that your program (dBASE III, MultiMate, DisplayWrite 4, and others) is sending to eject the page at the end of the job. You can do this by using

**NET PAINT=xxxx**

(where xxxx is your printer output device) on the printer server PC. Then send the form or document to print. The print output will still spool but will show a status of Paused for the print job. Note the ID number of the print job and then use a utility such as *The Norton Utilities* to inspect the contents of PQnm.SPL (where nm is the ID number of the job). Look at the end of the file for the unique string of characters (usually a form feed followed by one or more characters) that your program uses to end the print job (note: PC LAN doesn't add the final carriage return and form feed until it spools the job out to the printer). In our case, using *DisplayWrite 4* printing to an HP LaserJet, we found the following "end-of-job" Hex string:

■ We received no software patches for IBM's PC LAN. Hasn't anyone found a way to optionally silence this "jabbering" program?

## ■ CONNECTIVITY CLINIC

8C, 8D, 1B, 45

or ASCII 12,13,27,69. Therefore, the filter input string setup in the Systemizer would be 12,13,27,69,13,12, and the fil-

ter output string would be 12,13,27,69.

If you have a printer with a "hex dump" mode, you could send the print job to the printer while in that mode and check the printed output for the filter input string.

Use the Net Continue Print command to resume spooling to the printer.

This program, called FILTER.BAT, sends the FILTER.DAT file out the printer port.

ECHO OFF

CLS

COPY FILTER.DAT LPT1:

This data stream, called FILTER.DAT, programs the Systemizer to filter CR-LF when it is part of a specific string.

&lt;&lt;ERASE&gt;&gt;

&lt;&lt;SYSTEM&gt;&gt;

&lt;&lt;RECORD&gt;&gt;

&lt;&lt;SYSTEM&gt;&gt;

(7)

(12,13,27,69,13,12=12,13,27,69)

(8)

This solution will be acceptable until someone writes a memory-resident filter program or IBM adds a form-feed option to its *PC Local Area Network Program*.

Vernon M. Miles

Hickory, North Carolina

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R. B. Gillstrom

Malvern, Pennsylvania

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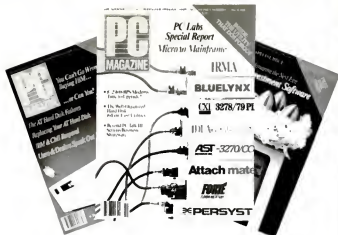
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Northgate has developed a thoroughly reliable method of using RLL encoding on the hard drives in all our 286 "E/T" systems. In 80286 systems, this technology is unknown to most of our competitors. Call them! You'll be amazed to find almost none offer RLL drives in 286 systems. Some will even tell you it can't be done. Next, ask about vital through-put factors like controller data transfer rates and interleaving ratios.

Most competitors merely assemble a collection of parts so archaic as to actually degrade performance. The Drive/Controller combinations most others use have the effect of **harnessing a race horse to a plow**. Processor speed is wasted because controller transfer time is so agonizingly slow.

Northgate takes the confusion, uncertainty and guesswork out of buying your computer. Skillfully assembled, thoroughly tested, your Northgate system arrives fully configured, ready to plug together and use. And Northgate has designed the most thorough, easy-to-follow documentation that takes novice or professional from set-up to English down. **WRITTEN IN SLUIT!**

We format and partition your hard drive to your specifications using advanced OnTrack Software which we even send with your system at no extra charge.

All these are the compelling reasons why Northgate Systems are used by: **Government Agencies**—FAA, EPA, DNR, USDOC, INTERIOR, USDA, NPS, **Fortune 500 Corporations**—RCA, Westinghouse, Intel, General Dynamics, Bell Southern, Dow Chemical, Honeywell and many more, **Colleges and Universities**—So. Cal., Duke, Iowa State, N. Car., S. Car., Mo., Harvard and more, as well as **thousands of small businesses and individuals worldwide**.

Add to all these features, the most meaningful Consumer Protection Policies in the computer industry (see next page).

For so long competition's bare bones prices and those just ordinary systems...

**COMPARISON WILL PROVE NORTHGATE OFFERS MORE!**



### STANDARD NORTHGATE SUPER/TURBO 286-60 "E/T" SPECIFICATIONS:

|                              |                                               |
|------------------------------|-----------------------------------------------|
| PROCESSOR                    | INTEL 80286                                   |
| PROCESSOR SPEED              | 8/12 MHz 1 WATT                               |
| MAKE OF BIOS                 | AWARD WSETUP IN ROM                           |
| EXPANSION SLOTS              | 8 (TWO 8 BIT, SIX 16 BIT)                     |
| STANDARD MOTHERBOARD MEMORY  | 1 MEGABYTE 120NS                              |
| CO-PROCESSOR SLOT            | YES                                           |
| CLOCK-CALENDAR               | YES WITH AA BATTERIES                         |
| NO. OF FLOPPY DRIVES         | 2—1 2MB and 360K MAY BE INSTALLED)            |
| BRAND OF FLOPPY              | FUJITSU                                       |
| NO. OF HARD DRIVES           | 1 (SPACE FOR TWO)                             |
| TYPE OF HARD DRIVE           | MINISCRIBE MODEL 3650 64.2 MEGABYTES          |
| HARD DRIVE FORMATTED         | USABLE                                        |
| STD. MONITOR TYPE            | SAMSUNG 12" AMBER TTL                         |
| STD. VIDEO CONTROLLER        | HERCULES COMPAT 1 P.P. 1 P.P. 1 S.P. 1 G.P.   |
| ADDITIONAL PORTS STANDARD    | ENHANCED 101 CLICK TYPE                       |
| KEYBOARD TYPE                | WITH HARD COVER                               |
| MS-DOS 3.2 & GWBASIC         | MANUALS                                       |
| CASE—FULL SIZE (NOT BABY AT) | HAS CONTROL PANEL, LED'S AND SECURITY KEYLOCK |

### SUPER/TURBO 286-60 "E/T" SYSTEM PRICE COMPLETE \$1999<sup>00</sup>

WITH ALL FEATURES ABOVE AND MINISCRIBE 32 MEGABYTE RLL HARD DRIVE SUPER/TURBO 286-30 "E/T" \$1899<sup>00</sup>

|                                                            |          |
|------------------------------------------------------------|----------|
| OPTIONS—ADD:                                               |          |
| MINISCRIBE HARD DRIVES UP TO 380 MEGABYTES                 | CALL     |
| SECOND SERIAL PORT                                         | \$ 35.00 |
| 3.5 INCH FLOPPY SWAP FOR 1.2 OR 360                        | \$ 98.00 |
| MATH CO-PROCESSOR CHIPS                                    | CALL     |
| COLOR GRAPHICS (CGA) MONITOR WCARD                         | \$295.00 |
| COLOR GRAPHICS (EGA) MONITOR WCARD                         | \$495.00 |
| MULTISYNC 14" MONITOR WCARD (VIDEO CARD IS AUTOTENSE TYPE) | \$695.00 |
| A \$240.00 RETAIL VALUE ALONE                              |          |
| HAYES COMPAT 1200 MODEM                                    | CALL     |
| HAYES COMPAT 2400 MODEM                                    | CALL     |

Use Our Toll-Free Order Number  
**800-548-1993**

**AND FOR THE BEST BUY IN XTURBO "E/T" SYSTEMS...TURN THE PAGE**

# Northgate's V20/8MHz XTurbo Is Now Available with 65MB Hard Drive and the same "Enhanced Technology"



NOW...for the buyer who doesn't need 286 speed but wants an XT type system with through-put up to four times faster than other systems, Northgate offers its XTurbo/V20/8-65.

This system also features the MiniScribe hard drive and SMS high speed controller. It is furnished complete with:

V20 Microprocessor • 640K Memory on Motherboard • 360K Floppy Drive • MiniScribe 60MB FAST Hard Drive with 1:1 interleave • 8 Expansion Slots • 2 Parallel, 1 Serial Port, Clock-Calender, Game Port • Amber Screen TTL Graphic Monitor with Hercules Compatible Video Card • Northgate "C/T" Click-Tactile 84-key AT style keyboard • Case is the AT style with turbo button, keylock reset button and indicator lights. (Second Floppy Drive pictured is optional at additional cost.)

## Complete System Price: \$1299<sup>00</sup>

Same system with 30MB Hard Drive \$1149<sup>00</sup>

### NORTHGATE GIVES YOU THE MOST POWERFUL CONSUMER PROTECTION WARRANTY IN THE COMPUTER INDUSTRY...

#### 30-Day Compatibility Warranty:

Northgate guarantees its systems will operate any standard, commercially available DOS programs written for use on IBM Compatible Computers. If, on consultation with Northgate, a program cannot be made to operate satisfactorily, owner may return the system, complete and unaltered for a prompt and full refund including all freight costs.

#### One-Year Overnight AT NORTHGATE

##### Expense Parts Replacement Warranty:

Northgate Computer Systems warrants that all systems sold by Northgate will be free of defects in workmanship and materials for one year from date of shipment.

In the event of failure of a part that disables the system, Northgate will ship the same day if notified by 12 Noon Central Time, a new replacement part. Customer must phone Northgate Customer Service for diagnosis of the failure.

Shipment of the replacement part will be by overnight express service—AT NORTHGATE'S EXPENSE—for next day delivery depending on the carrier's ability to provide such service in owner's geographic area.

Owner must return any replaced part, complete and unaltered, and pay return shipping costs, to be received at Northgate within two weeks after receiving the replacement part.

Northgate's Customer Service department will provide full instructions on making the repair or replacement and will consult with customer on the phone to assure repair is properly completed and the system is again operating.

In the case of a complete system returned for repair under warranty, customer pays freight to Northgate and Northgate pays return freight by whatever service the system is sent to Northgate.

In the event of a part replaced under warranty, the new part carries a NEW ONE-YEAR GUARANTEE FROM SHIP DATE!

NOTE: Many computer vendors extend only the parts manufacturer's warranty which may be as little as 30-days. All products sold by Northgate are fully guaranteed by Northgate for one year from date of shipment.

TERMS: Northgate accepts VISA and MASTERCARD charge cards with no surcharge. Purchase orders from established accounts, also accepted as well as COD (Cashiers Check) and Wire Transfer. Personal and Company Checks require 18 days to clear. APO and foreign orders accepted. All shipments are FOB Plymouth, MN. Delivery is subject to time required for order processing, manufacturing and 24 hour testing.

### CONSUMER PROTECTION TIP TO PROSPECTIVE COMPUTER BUYERS:

When shopping, remember the Better Business Bureau Motto: "If it sounds too good to be true, it probably is!" Exceedingly low prices are your first warning.

Most computer direct sales firms are trustworthy. BUT, better to be safe than sorry.

BEFORE YOU PLACE YOUR ORDER, PHONE THE BETTER BUSINESS BUREAU OFFICE IN THE VENDOR'S AREA. (Your local BBB will give you the phone number for the appropriate office.)

### Use our Toll-Free Order Number

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Hours: M-F  
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**Reports** "Northgate's excellent tactile response approximates the "clicky" feel that IBM keyboards are known for. Typing on the C/T is smoother and more comfortable than on any of the replacement or clone keyboards I've tried." *Jonathan Matzkin*

**10-DAY TRIAL  
MONEY BACK  
GUARANTEE**

## TOUCH TYPING IS BACK!



**\$99.00**



**\$79.00**

### ENHANCED 101-KEY MODEL C/T 101:

Separate cursor pad and numeric keypad; Enlarged L-shaped Enter Key; Double-Wide Backspace, Shift, and CapsLock Keys; Lights for CapsLock, NumLock, ScrollLock. Fully A-T and XT Compatible. Heavy, metal base, keyboard won't slip around on desk.

### THE TOUCH, THE SOUND, THE FEEL OF A SELECTRIC TYPEWRITER. YOU CAN GET IT NOW! INTRODUCING THE NORTHGATE "C/T" (Click-Tactile)

You're reading this ad because your current keyboard leaves a lot to be desired. IBM set the standard with the original PC Keyboard. And nothing else came close - UNTIL NOW!

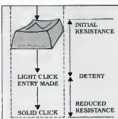
### LOW QUALITY CLONE KEYBOARDS EQUAL LOW COST CLONES...

Why are most clone keyboards so lacking? Because clone makers buy low cost keyboards to keep system costs down. The majority come from three manufacturers - KeyTronics, Maxi-Switch and B.T.C. All have a rubber-like membrane beneath the keys. That's why they feel spongy. No sound, no sensation. Just a mushy feel and a distant "thunk" as the key hits bottom.

We searched the world three years to find the ideal keyboard. With the feel, sound and touch of an electric typewriter. Whose keys give a solid, positive entry. WE FOUND IT! And now it's standard with all Northgate XTurbo and ATurbo Systems.

### OUR CUSTOMERS TOLD US "SELL THESE KEYBOARDS" TO EVERYONE!

To our delight, buyers of our systems began buying our "C/T" keyboards to replace those they purchased before they discovered Northgate quality and value. It was these customers who suggested we offer the new "C/T" Keyboard to all PC users looking for a better keyboard.



### TRY THE NORTHGATE "C/T"... YOU'LL FEEL THE DIFFERENCE.

Plug the Northgate "C/T" into your system. Press a key. WOW! At first touch you know this is it! The key passes detent at center position with a slightly audible "click" Sound and change in tension tells your fingers you've made an entry. As the key bottoms, a more positive click confirms the entry and signals the finger to release and hit another key. Touch typists love it.



New sculptured profile design

In actual typing tests, speed increased by up to 28 percent with a 16 to 20 percent reduction in errors. Besides making typing enjoyable again, the increases in production you will get with the "C/T" should be enough reason to replace all your keyboards!

Enhanced 101-key Model

**ONLY \$99.00**

(Compatible with XT or AT)

Standard 84-key AT Style

**Only \$79.00**

### STANDARD 84-KEY MODEL:

This model features the functions keys on the left as in the original IBM design. Has the same Click/Tactile feel as the 101-key model. Features L-Shaped Enter key, double-wide CapsLock and 3 LED Lights.

### THE SECRET...

Is in Alps Keyswitches, the most expensive, highest quality switches available for keyboards. Someday buyers will demand all computer keyboards have the feel of the Northgate "C/T" and all keyboards will be made with Alps Switches. For now, only the very highest priced boards use them.

### 3-YEAR WARRANTY UNCONDITIONAL!

New Features—F11 and F12 Keys Fully Functional and Programmable. Shows full 101 layout on screen when used with IBM Diagnostics.

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| Everex EGA Autoswitch .....   | \$139 |
| Everex Edge .....             | \$199 |
| Hercules Color Card .....     | \$145 |
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| Graphics Card .....           | \$85  |
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| NEC GB1 .....                 | \$259 |
| Paradise Autoswitch 480 ..... | \$169 |
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| Quad EGA .....                | \$229 |
| STB EGA Plus .....            | \$239 |
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- 640K of RAM
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- One Year Warranty
- Clock/Calendar

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- 30 MB XT 20 MB AT

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Half Height, IBM Compatible



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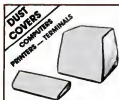
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## COMING UP

### COMPAQ'S 20-MHz MACHINE

Compaq has beaten IBM to the punch again, introducing a 20-MHz, 80386-based PC that blows the PC Labs benchmark tests away. Bill Machrone describes the wonders of the Compaq Deskpro 386/20. Then, contributing editor Winn L. Rosch tells you everything you need to know to shop in the 386 marketplace successfully, and he examines five replacement 386 motherboards from Dyna Computer, Hauppauge, Intel, Monolithic Systems, and Zeos International that will turn your XT or AT into an instant speed demon.

**CLASSIFIED ADD-INS** Lotus 1-2-3 users are getting more mileage out of the program with the help of the first wave of true add-in products. There are add-in databases, add-in word processors, add-in note-takers, and add-in decision support programs, all designed to give 1-2-3 the extra features you need but haven't gotten from Lotus. PC Labs evaluates this group of 18 add-ins, and Jim Seymour explains the advantages of adding a few useful bells and whistles to your trusty old spreadsheet program.

**WORM DRIVES ARRIVE** Pundits have been extolling the virtues of write-once, read-mostly optical disk drives for over a year, but real products are just now starting to emerge from beta labs. PC Labs examines drives from Information Storage, Maximum Storage, Micro Design, N/Hance, and Optotech and subjects them to a battery of performance tests to see whether they really live up to their advance billing.

**FIVE PCS, ONE PRINTER** One of the best ways to stretch your computer dollar is to share equipment whenever possible. Why not consider sharing printers, plotters, modems, or other peripherals among several PCs? Take a look at 18 sophisticated device sharers that will make your peripherals earn their keep. Use enough of them together, and you may even end up with a small network of your own design.

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**List Price:** *The Ancient Art of War* and *The Ancient Art of War at Sea*, \$44.95 each. **Requires:** *The Ancient Art of War*: 128K RAM; CGA or EGA; DOS 2.0 or later; joystick optional. *The Ancient Art of War at Sea*: 256K RAM; CGA, EGA, or Hercules adapter; DOS 2.0 or later; joystick optional. Copy protected. Broderbund Software Inc., 17 Paul Dr., San Rafael, CA 94903; (415) 492-3500.

CIRCLE 654 ON READER SERVICE CARD



In *The Ancient Art of War at Sea*, you must protect your crowns (at the bottom of the screen) from enemy warships.

## The Origin of "I Have Not Yet Begun To Fight" and Other Noble Sentiments

The *Ancient Art of War* series aims to educate and entertain. The following is from the chapter in the program manual, titled "A Brief History of the Age of the Fighting Soil."

British admirals had little respect for the newly formed American Navy, but one man gave them more trouble than they bargained for. That man was John Paul Jones, whose most famous battle was in England's home waters.

In 1779, Jones was on the frigate *Bonhomme Richard*. He spotted a convoy of 41 British merchant ships under the protection of the *Serapis*, one of the newest and most powerful frigates in the British fleet.

Captain Pearson of the *Serapis* clearly had the advantage with more firepower. Using a trick that would later be reenacted by Errol Flynn in the film *Captain Blood*, Jones flew a British flag. When he felt he was close enough, Jones lowered the British flag, raised the Stars and Stripes, and sent out a powerful broadside into the *Serapis*. The *Serapis* answered immediately with a broadside of her own, which ripped into the *Richard*'s hull and destroyed crew and cannons.

Under another leader, this might have been the end of the battle, but Jones performed a brilliant maneuver. Backing off the sails, he turned the *Richard* across the *Serapis*' stern and raked her with his remaining guns. Now at close quarters, Jones tried to board the *Serapis*, but his crew was being slaughtered by the British marines. Pearson called out to Jones, "Has your ship been struck?" Jones replied, "I have not yet begun to fight!"

For three and a half hours, John Paul Jones had outmaneuvered and outfought one of the Royal Navy's best captains. Finally, Pearson surrendered and offered his sword to Jones. Instead, Jones invited Pearson into his cabin for a glass of wine.

Later, a British court could find no fault with the performance of Pearson and knighted him for gallantry. When Jones heard of this, he said, "Should I have the good fortune to fall in with him again, I'll make him a lord!"

Excerpted from *The Ancient Art of War at Sea*, copyright 1987, Broderbund Software; reprinted with permission.



When one of your squads encounters an enemy squad in *The Ancient Art of War*, you can zoom in on the action.

# Tax Preparer is not for everybody.

**L**ook. If I were filing a 1040-EZ, I'd just do it by hand. But my return is a lot more involved. I need software that's more than just blank forms and a calculator. I need a power tool. So I use Tax Preparer® by HowardSoft®.

*"With Tax Preparer,  
all I do is enter my raw data.  
The rest is automatic."*

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# AFTER HOURS



## PERSONAL FINANCE

### CheckMate Will Pay Your Bills for \$29.95

BY DONALD TRIVETTE

For all of you still writing checks by hand, here's your chance to try a nifty little program that *almost* makes check writing fun. The program is *CheckMate*, and since it's shareware, you only pay if you like and use the program. *CheckMate* can be downloaded from CompuServe and other public bulletin boards, or you can order it directly from the developer, Custom Technologies, for \$29.95.

The company says it will promptly refund your money if you don't like the program; if you do use it, you're obligated to pay the retail price.

*CheckMate* uses a pull-down menu system to present its five top-level commands: Account, Transaction, Reports, Calc, and Setup. Use the Account command to establish and switch between a checking and savings account, for example. The Transaction command is used to post deposits, income, and enter checks. Pressing the F2 key displays a menu of up to 50 predefined checks which you can en-

ter for recurring monthly expenses; if the dollar amount is left blank, the cursor will jump to that field and await an entry—a nice touch for an inexperienced programmer.

But there are a few missing features, too. How many times have you made mistakes like entering \$35.33 in your check register only to find, when you got your bank statement, it should have been \$35.53? The Reconcile command needs a way to fix an incorrect entry. And the 52-page manual that supplements the contextual help screens needs an index. However, the most glaring omission from *CheckMate* is its inability to include the mailing address of the payee on the check; you can't use window envelopes. The developer says the next version will correct this oversight. If that's important to you, get the more expensive check-writing program *Quicken*, which is \$49.95 from Intuit Software (see "Quicken, the Checkbook Manager, Does One Thing and Does It Well," *After Hours*, *PC Magazine*, September 29, 1987).

**List Price:** *CheckMate*, Version 1.05, \$29.95. **Requires:** 128K RAM, one disk drive, DOS 2.0 or later. Not copy protected. Custom Technologies, P.O. Box 10096, Panama City, FL 32404; (904) 763-5849.

CIRCLE 696 ON READER SERVICE CARD



## ON-LINE SERVICES

### Reaching Out: FidoNet Cuts Across BBS Borders

BY CHRISTOPHER JOHNSTON

In the seventies it was the CB radio on interstate highways, but in the eighties, strangers get can chew the fat via on-line services and electronic bulletin board systems (BBSs). Nothing has

sages, harvests outgoing messages, and sends them speeding through as many as a dozen different systems to their remote destinations.

To send a message, you find the address of the target system from a node list put out—and updated weekly—by IFNA. You can send a private message to one user or to an entire system by sending it to the SysOp (system operator).

The latest enhancements to the FidoNet protocol include the ability to tack a binary file onto the end of a message (with software from the Opus BBS), and Echomail, which sends multiple

*The International FidoNet Association runs a bulletin board that can get you started on the FidoNet circuit.*

For the convenience of our new users here is a listing of commands available when using FIDO

#### Main System

- B...Select message area
- F...Add to file transfer area
- R...Send bulletin from the queue
- L...Send with the queue
- C...Change name info
- A...Answer questioning
- D...List users
- W...Withdraw, then no, name of system transferred
- E...Send the editorial
- G...Display current file version
- S...Send-type (log off)
- T...JUMP

#### Message System

- A...Select a message area
- S...Send message

helped break the ice more than FidoNet, a mail-message program that links BBSs. Your local BBS is a good place to correspond with local PC users; FidoNet expands your circle to a national circuit.

The International FidoNet Association (IFNA) manages the specifications and oversees the timely delivery (usually one night) of FidoNet mail between 1,700 IBM-based BBSs in North America, Europe, and Australia.

The FidoNet system works as well as it does only because it's completely automated. FidoNet bundles messages from your local BBS into one file; then at some ungodly hour of the night a modem from a network system calls the local BBS, uploads incoming mes-

sages, harvests outgoing messages, and sends them speeding through as many as a dozen different systems to their remote destinations.

SysOps generally charge FidoNet users 25 cents for every message they send in order to cover long-distance charges incurred during mail-file transfers, but it varies. To join the Fido network you need only call IFNA's dataline to find a BBS in your area.

**List Price:** FidoNet, charges set by local BBS. **Requires:** 1,200-bps modem, International FidoNet Association, P.O. Box 41143, St. Louis, MO 63141; Data Phone: (314) 576-2743 (set your modem at 1,200, 8, N, 1).

CIRCLE 695 ON READER SERVICE CARD

With *CheckMate*, writing a check to the electric company is a snap: select predefined transaction number 2 from the *PayTo* menu and press Enter.

|                                                                     |             |                           |              |
|---------------------------------------------------------------------|-------------|---------------------------|--------------|
| Enter Transaction                                                   |             | Current Account Selected: |              |
| Pay To Name                                                         |             | Account Is Due: 7         |              |
| 1: Car                                                              |             | Account Type: Checking    |              |
| 2: Electricity                                                      |             |                           |              |
| 3: Gas                                                              |             | Check Number: 238         |              |
| 4: Telephone                                                        |             | Amount: 8.86              |              |
| 5: MCI Mail                                                         |             | Balance: 997.47           |              |
| 6: Savings                                                          |             | Number:                   |              |
| 7: Other                                                            |             |                           |              |
| 8: Other                                                            |             |                           |              |
| 9: Other                                                            |             |                           |              |
| Comments:                                                           |             |                           |              |
| Pay Flag: 00                                                        | Printed: 00 | Cleared: 00               | Reopened: 00 |
| 1: back 2: menu 3: help 4: prev page 5: next page 6: select 7: exit |             |                           |              |

# MacInTax™/TaxView™

## THE INCOME TAX PROGRAM

• **DISPLAYS EXACT FORMS ON SCREEN** - enter data directly into displayed forms. Automatic calculations and linking across all forms, schedules, worksheets and itemizations

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• **IRS INSTRUCTIONS ON SCREEN** - displays entire IRS booklet on a line-by-line basis.

• **PRINT ENTIRE TAX RETURN WITH ALL DATA** - all printouts IRS APPROVED FOR SIGNATURE AND SUBMISSION, INCLUDING FORM 1040.

• **INTERFACES TO SPREADSHEETS, DATABASES, AND ACCOUNTING PROGRAMS** - import "text" files directly into the program.

**MacInTax/TaxView FEDERAL:**  
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Performs five-year projections of tax liabilities for five alternative strategies, using the new tax laws. Requires MacInTax Federal to operate.

\* plus \$5.00 shipping/handling, CA res. add 6% sales tax

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CIRCLE 193 ON READER SERVICE CARD

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*This Checks & Balances Income/Expense Summary report shows 167 transactions for the first three months.*

a lot of check writing, *Checks & Balances* can help get your affairs in order.

**List Price:** *Checks & Balances*, \$74.95. **Requires:** 256K RAM, one disk drive, DOS 2.0 or later. Printer recommended. Not copy protected. CDE Software, 948 Tularosa Dr., Los Angeles, CA 90026; (213) 611-2031.

your heart's set on Antarctica, look elsewhere). You pick a ballpark estimate of cost, time of year, and such sundries as the quality of food and special activities, then let it search.

Only professionally run package tours are included, so you won't find a quiet bed and breakfast here, but you will learn about cruises, mountain climbing, and ski tours. It's best at suggesting dream trips like skin diving in the Maldives Islands (\$5,700); a 41-day climb of a Himalayan peak (\$11,500); or (my favorite) a 66-day cruise from San Francisco to Southampton, England, with ports of call in Fiji, Hong Kong, Egypt, and Gibraltar.

It's not comprehensive (you can search for golf as an activity, but it won't direct you to any Scottish courses). It has little consolation for the budget-minded (the best trips are over \$5,000). And you'll still have to contact a travel agent for details (only one screenful is presented on each trip).

But if you've got a mind to take an African safari, here's a good place to start looking. **List Price:** *SelectTrip*, \$49. **Requires:** 256K RAM, one disk drive (hard disk recommended), DOS 2.0 or later. Not copy protected. *SelectTrip*, 2443 Fair Oaks Blvd., #335, Sacramento, CA 95825; (800) 237-9111.

CIRCLE 657 ON READER SERVICE CARD



### **How to Find An African Safari Without a Travel Agent**

BY GUS VENDITTO

Wanderlust is a terrible thing to waste. You won't spend another week at the same familiar beach if you spend some time with *SelectTrip*, a database of more than 2,500 packaged tours. You'll be dreaming of camel rides near the Pyramids and ski trips on virginal Himalayan snows.

*SelectTrip* packs a well-designed front end with an eclectic mélange of vacation ideas. It helps you target your desires by asking you to choose a vacation spot anywhere from the Yukon to Yemen, from Bhutan to Zimbabwe. All readily accessible parts of the globe are covered (if

**PERSONAL FINANCE**

### Checks & Balances: A Task Master That Can Put You on a Budget

BY DONALD TRIVETTE

In the software business there are two choices: go head-to-head with an established product, or look for a slot between products. *Checks & Balances* is a checkbook manager that falls between *Quicken*, a no-nonsense program that does what it does really well (see *After Hours*, *PC Magazine*, September 28, 1987), and *Managing Your Money*, the most sophisticated home financial management program around (see *First Looks*, page 34, *PC Magazine*, February 10, 1987).

*Checks & Balances* is driven by commands typed on a command line at the bottom of the screen. They include **Enter** to enter checks, deposits, credit card purchases, and other types of transactions; **SHOW** to display what you've entered; **BILLS** to record accounts payable; **Sort** to put transactions in date or check number order; **Total** to display summaries and reports; and **Balance** to balance and reconcile it all.

A dozen other commands are for housekeeping chores like

configuring the printer, recording payee names and addresses, and printing continuous-forms checks.

The ENTER command is the one you'll use most often; unfortunately, it suffers from a bad case of screen clutter. The top six lines contain a user-defined list of abbreviations—things like MED for medical and POST for postage; the next line is a reminder of what should be entered into each field on the check; the next six lines represent the check itself; and the following six are for another check, so that information for two checks is visible on the screen at once. Check fields are delimited by greater-than and less-than symbols. The overall appearance is one of confusion. For entering transactions, *Quicken's* entry screen, where a check looks like a check, is superior.

Once you figure out where it goes, there's plenty of space for recording information. A 47-character payee field and four subtotal breakdown fields are more than generous. Address information is contained in a separate file accessed through the NName command. *Checks & Balances* has a budgeting command, and the program permits the flagging of tax items, for easier analysis of your finances.

The program shines when it comes to output. There are a variety of reports—all crisp, well organized, and useful. If you do

SelectTrip gives you only a screenful of information on each trip; you'll have to contact the tour director for more details.

[illegible]



# I fell 20,000 feet and lived.

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mode and successfully battled enemy aircraft.

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The next time I flew they had repaired the Sears Tower. My next stop? The World Trade Center.

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# AFTER HOURS



## PERSONAL GROWTH

### Social Climbing as a Business Opportunity: Lessons from a Master

BY MERV ADRIAN

Ever wonder what it takes to be a successful entrepreneur? Mark McCormack knows; he started International Management Group, which handles many of the top athletes in the world, getting them lucrative endorsement deals, creating and promoting events, and the like. In 1984, he published *What They Don't Teach You at Harvard Business School*, a best-selling guide to entrepreneur-

simulation techniques to McCormack's talents to produce the PC version of *What They Don't Teach You at Harvard Business School*.

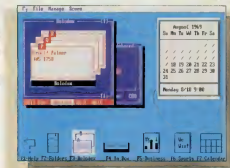
The flavor of this simulation is far from that of *Business Advantage*, which puts you behind a CEO's desk, focusing on the balance sheets of a large corporation. *What They Don't Teach You* stresses the active management tasks needed to build your own business, according to McCormack.

The game is divided into three acts corresponding to the growth stages of IMG, the management company you're trying to build in the early 1960s.

As the game starts, you have just signed your only client, Arnold Palmer, who is about to go into a period of great earnings. Your goal is to sign other athletes, successfully negotiate a contract with them, and then find contracts for them endorsing products and playing at tournaments.

You do most of this at networking events: parties and golf at prestigious country clubs. You set up a business meeting by calling someone whose business card is in your Rolodex.

However, your Rolodex is empty. You can only get those precious contacts into it by exchanging business cards with people at networking events. Of course, you often have to arrange to be introduced to them first, and it's possible to offend people by not saying hello to them at one event if you've met them at others, or by saying the



You start out with only Arnold Palmer as a client but, if you play your cards right, you'll soon be managing the careers of Evonne Coolidge and Gary Player.

wrong thing or flirting with them (especially if you've opted to have a few drinks).

Does all this sound complex and difficult? Actually, it's not; it's rather fun.

Getting clients and obtaining contracts for them is only part of the game, though. You also have to manage the nuts and bolts of your business: hiring good employees as the business grows, checking your inbox for messages, keeping up with the business news, and monitoring the sports pages for new opportunities.

Anyone who's amused by social climbers will enjoy the joking and gossiping you're encouraged to engage in at parties

in order to establish business relationships. Those who find this kind of behavior obnoxious won't enjoy the game.

But, if you enjoy a good party, you may quickly find yourself forgetting about the business you're supposed to be building, as you enjoy the social whirl.

**List Price:** *What They Don't Teach You at Harvard Business School*, \$49.95. **Requires:** 512K RAM, two disk drives (hard disk recommended), DOS 2.0 or later. Copy protected. Reality Technologies, 3624 Market St., Philadelphia, PA 19104, (215) 387-2179.

CIRCLE 650 ON READER SERVICE CARD

## AFTER HOURS INDEX

### Checks & Balances

A program that can put you on a budget

### SelectTrip

If you've got the time and money, they've got the vacation

### CheckMate

A simple, shareware check-book manager

### FidoNet

Better and further than CB radio

**The Ancient Art of War**  
**The Ancient Art of War at Sea**

Learning games that put priority on historical accuracy

ship, and he's currently on the best-seller lists with *The Terrible Truth About Lawyers*.

Reality Technologies, producer of *Business Week's Business Advantage* (see After Hours, *PC Magazine*, November 10, 1987) have added its

## Are You Fit to Manage?

An extra feature in *What They Don't Teach You at Harvard Business School* is a "Management Challenge," based on a test designed by clinical psychologist Dr. David Keirsey.

The Keirsey Type Sorter asks you to solve hypothetical dilemmas. For example: Your senior accountant warns that expenses outweighed income and suggests a public stock offering. You have to decide whether losing independence is worth the extra capital.

The answers are analyzed on four criteria: how you establish relationships, how you gather information, how you use information, and how you manage your priorities.

You're not graded but given a profile of your business personality. —Gus Venditto

print "Merry Christmas"  
end



```
#include <stdio.h>
say Merry Christmas
void main ()
{
    printf ("Merry Christmas\n");
}
```



MODEL SMALL  
STACK DATA 100h

org 0h "Merry Christmas\$"

CODE  
mov ax,DGROUP  
push ds,ax  
mov ah,9  
mov dx,OFFSET xmas  
int 21h  
mov ah,4ch  
int 21h  
END start



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Dr. Kent Chamberlin, University of New Hampshire,  
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Greg Tinfow, R & D  
Laboratory, Stanford

*"QuickC's built-in debugger and source code editor are a formidable feature."*

PC AI Magazine (Oct  
1987, by Brian Flam

# It seems obvious you've got an "A."

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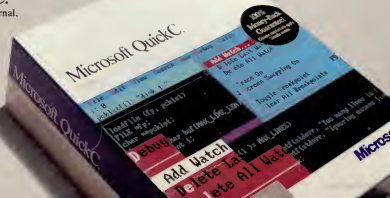
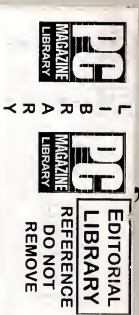
Jim Nech, President, Houston Area League of PC  
Users (HAL PC).

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Alan Holub, Dr. Dobbs' Journal,  
October 1987.

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